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ABSTRACT

The 594 studies referenced in this volume, the first of a two-volume set, synthesize reading comprehension research conducted from 1974 to 1984. The 12 chapters cover the following topics: (1) the necessity for both quantitative and qualitative meta-analysis for a complete state-of-the-art understanding of any domain, (2) the background of the research project that generated this volume, (3) a quantitative meta-analysis of reading comprehension research, (4) research on reading comprehension instruction, (5) reading instruction with the special education student, (6) a cognitive approach to reading for the learning disabled, (7) reading comprehension processes as critical thinking, (8) exemplary studies for teachers to use, (9) using background knowledge of readers, (10) teachers as researchers and present research needs, (11) measurement in reading comprehension research and in classrooms, and (12) a synthesis and assessment of reading comprehension research. The appendixes provide a taxonomy of reading comprehension variables, a list of hypotheses that reading researchers test, the references for the 594 studies, additional references; and information about the authors and editor. (HOD)

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LANDSCAPES:

A STATE-OF-THE-ART ASSESSMENT OF READING COMPREHENSION RESEARCH

1974-1984

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FINAL REPORT
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PREFACE

AN OVERVIEW OF LANDSCAPES

Avon Crismore

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In 1983 the Federal Government funded a major assessment of reading comprehension research and practice for purposes of improving the teaching of reading comprehension for special education students. This volume, the first of a two volume set, addresses the first part of the grant -- a state-of-the-art assessment of reading comprehension. The size of this task precludes an exhaustive synthesis of everything that was learned during the assessment. What we present in this volume instead are slices of the data that we gathered concerning the reading comprehension research conducted from 1974-1984. The authors of the chapters in this volume took their own paths as they explored slices of the landscapes; topics were chosen by the authors based on their personal interests and areas of expertise. The volume gains its unity from an overall perspective comprised of the underlying assumptions, beliefs, and principles held by the research team.

This volume is an exploration of charted and uncharted landscapes of 1) the subject matter -- reading comprehension research, and 2) the methodology -- meta-analysis. We have used the metaphor of landscapes, a series of vignettes and scenarios, and a variety of visual displays to try to help make our presentation more accessible and interesting to a wide array of readers. We saw that our task was to inform our readers about what was happening in reading comprehension and what this then implies for classroom teachers - how they might better understand and make use of what we found. We have attempted to be as practical and applied as possible by identifying 1) current practice, 2) needed changes, 3) suggestions for how to go about making the needed changes, and 4) issues and questions generated by current research. We have attempted then, to lay the conceptual groundwork so that others might explore many of these generated issues and questions with further research; design exemplary reading comprehension programs, curricula, instructional materials, and demonstration sites; and develop alternative methods of assessing reading comprehension.

Beliefs and Assumptions

We believe that all students are special education students. Because of their individual differences in mental and physical abilities, in permanent personality traits and temporary mental states, in attitudes and beliefs, and in background experiences and opportunities to learn - all students need a special education in reading comprehension. The information contained in this volume should help teacher-researchers and teacher researcher collaborators gain a better understanding of how to accomplish such reading comprehension goal.

We also believe that teachers should consider themselves as teacher-researchers and that this volume can help show teachers why this is important and how it can happen. In addition, we believe that just as integrating and synthesizing the data for this project was the result of a social process and a social construction for the members of the research team, so too is the integrating and synthesizing that is needed for reading comprehension dependent on a social process and a social construction involving both learners and teachers. Interpersonal relationships between teachers and students, students and students, and authors and readers are necessary for improving reading comprehension.

Finally, we believe that the meaning of the prefix meta needs to be broadened to include the critical and speculative as well as the objective, systematic, and analytical aspects. In analogy to metaphysics or metacommunication, a meta-analysis would consist of conceptualizations that are not part of the analysis itself but that are about the analysis. It is a going beyond analysis to include not only descriptive judgments but also evaluative judgments. A meta-analysis, because it is self-reflexive, involves a coming at it from a subjective, biased viewpoint. Therefore, it necessarily must be evaluative but it is also objective, systematic, analytical, and explanatory. A meta-analysis that does not do any self-reflection of the methodology, i.e. that only reiterates the data finding, is a pseudo-meta-analysis. We are arguing that our meta-analysis is a true meta-analysis; in fact, it is a meta-meta-analysis. This perspective provides a framework for our volume.

In addition to presenting a synthesized view of the state-of-the-art by pulling together ten years of research and pointing out the important trends and how the specifics of the studies relate to teachers, students, and classrooms, we also wished to be practical and applied regarding methodology. Thus, our volume provides a natural history of the research project - the plans and changes in plans, the rationales and justifications, the procedures and processes, and the strengths and limitations found for quantitative and qualitative meta-analysis. We believe this will be useful not only for understanding this volume, but also as aids for other research projects similar to this one.

The references for the 594 studies in the data set represent a refined tool for focusing on specific areas in reading comprehension research without undergoing time-consuming, costly literature searches. They are presented in an organized systematic way to allow teachers, graduate students, and researchers easy access and use.

Part I, the prologue, consists of two chapters. Short argues in Chapter 1 that both quantitative and qualitative meta-analysis are necessary for a complete state-of-the-art and state-of-knowledge understanding of any domain. She supports her case by citing the strengths and weaknesses of both kinds of meta-analyses -- the relatively new quantitative approach and the more traditional narrative reviews of the research. She concludes with a redefinition of meta-analysis which sets the scene for the rest of this volume. In Chapter 2, Rowe and Harste describe in depth the history of the research project and the plans and procedures used. They give descriptions of the taxonomy and coding sheets, the rationales for using quantitative and qualitative meta-analysis, and the methods and procedures for both. These two chapters provide needed background information for understanding the rest of the volume.

In Part II Rowe reports the findings of the quantitative meta-analysis and supplements those with caveats for the reader. She concludes by stating that the important contribution of quantitative meta-analysis is its ability to delineate the patterns and trends for reading comprehension research during the past ten years.

Part III continues by reporting the findings of the qualitative meta-analysis. The eight chapters in Part III present eight slices of the data that was gathered.

Rowe authored the first slice, Chapter 4, a guided tour of the landscapes. This chapter presents an overview of the important trends in instructional reading comprehension research using the categories of reader, text, task, and processing strategies. Stephens follows in Chapter 5 by presenting a summary of the special education reading comprehension research. She makes the point that the findings from research in regular classrooms no doubt apply equally as well to special education classrooms. She presents a list of questions generated by these studies and offers a list of possibly helpful strategies for teachers.

In Chapter 6 Busch discusses a new way to look at reading comprehension for the learning disabled. She sees social interaction and metacognitive monitoring as useful ways to improve teaching of reading comprehension and at the end of her chapter offers a compendium of strategies for teachers to use. Chapter 7 offers another new approach to teaching reading comprehension.

Short defines and explains critical thinking as a needed approach for teaching reading and critiques a number of instructional studies based on the extent to which they promote critical reading. Short finds most of the studies wanting in this respect.

In Chapter 8 Dahl and Roberts discuss and comment on the exemplary studies that teachers might use as models in their teaching. Each author responds not only to the studies, but to each others' reactions as well. Heine's slice in Chapter 9 focuses on background knowledge of readers. Heine categorizes background knowledge into four types: content, structure, pragmatic, and strategy and then synthesizes the studies for each type. He raises some concerns about the lack of research on the interactions among context and reader background knowledge.

In Chapter 10 Snyder looks at the research with teachers as collaborators or as teacher researchers. She argues that teacher-researcher is critical for effective research for and gives practical suggestions for how teachers can become teacher-researchers.

In Chapter 11, Cousins synthesizes the finding for the kinds of measurement used by reading researchers to assess reading comprehension and the possibilities of these as alternatives to the kinds of measurement now used in classrooms. She discusses the similarities and differences between research and classroom measurement and points out areas for further research in measurement.

The volume ends with Part IV, Harste's meta-meta-analysis in Chapter 12. Harste sketches a portrait of the newly emerging paradigm in reading comprehension based on evidence from the data base. He examines the underlying assumptions of the reading comprehension researchers and identifies three major shifts in assumptions that help explain the patterns of dominant and non-dominant hypotheses found in the meta-analyses. He then gives the characteristics and promises of the new paradigm.

We believe the appendices are an important part of the volume. In Appendix A we have provided a taxonomy of reading comprehension variables that both researchers and teachers can use as guidelines in designing research and curricula. The multiple coding concept demonstrates how a research study can be coded on many aspects for a richer, more flexible method of interpreting and applying comprehension research. Appendix B contains a list of hypotheses that reading researchers test which we hope will invite stimulating discussions and new research designs. Appendix Ccontains the references used for the 594 data base studies, and Appendix D additional references. Information about the authors and editor is found in Appendix E.

Composing this collection of landscape slices has been as creative an endeavor -- interesting, challenging, and satisfying -- for me the editor as, I am certain, it has been for the author of each chapter. Our hope is that this also holds true for you the reader-composer. We invite you to experience our landscapes from different perspectives and for different purposes. Each shift of perspective will give new and deeper understandings of the state-of-our current knowledge and beliefs about reading comprehension and its application in classrooms.

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Reference note

PART I: PROLOGUE

CHAPTER 1

A TOOL FOR SURVEYING THE LANDSCAPES: THE CASE FOR BOTH QUANTITATIVE AND QUALITATIVE META-ANALYSIS

Kathy Gnagey Short
Indiana University

INTRODUCTION

The field of education, along with other social sciences, has experienced an explosion of research in the last twenty years. Cooper (1982) points out that most researchers today cannot keep up with primary research reports except in a few areas of specialization. Consequently, both researchers and teachers are relying more and more heavily on integrative research reviews to synthesize separate empirical findings into a coherent whole that can be used in informing future research and classroom practice. These integrative research reviews have provided readers of research with a way to quickly survey a landscape that has become so broad that one person can no longer explore and know every part of it.

One technique or tool of surveying the landscape of individual research studies has received a great deal of attention recently. This tool is meta-analysis and was proposed by Glass (1976) as a rigorous, quantitative alternative to more casual, narrative discussions of research. Since then, meta-analysis has been the topic of a debate which has ranged from viewing it as a passing fad to believing that it will become an integral part of all research methodology. This chapter is an attempt to help researchers and teachers better understand this debate by discussing the various issues involved in using meta-analysis as well as its strengths and limitations as a good surveyor of the landscape. A good understanding of the technique of meta-analysis is essential to the reader of this book because the data base and review procedures that underly the following chapters were based on meta-analysis. In addition, because of its current popularity among reviewers, teachers and researchers need to understand the technique in order to evaluate the usefulness of findings from other integrative reviews based on meta-analysis and to have a basis for making decisions on whether or not to use meta-analysis as a synthesis technique in their own work.

This discussion of meta-analysis will be based on a review of the literature available on quantitative meta-analysis, especially the various articles written by Glass who introduced the technique. It will also be based on our experience as a research team conducting a meta-analysis on reading comprehension as part of a US Department of Education contract to survey the state of reading comprehension, particularly as it relates to special education students.

As our research team attempted to use meta-analysis, it became obvious to us that the traditional definition of meta-analysis as a quantitative tool was too restrictive and eliminated valuable information which was needed in order to be able to interpret the findings. We, therefore, chose to expand meta-analysis to involve both quantitative and qualitative syntheses of research. The quantitative scores by themselves had no meaning apart from the context within which the research and instructional procedures were conducted and so were of limited usefulness. A major contention of this chapter is that we need to redefine meta-analysis if we want our surveys of the landscape to better reflect that landscape and to help us more productively continue our journeys through that landscape.

This chapter will initially discuss meta-analysis based on its traditional definition as a quantitative analysis. It will first of all look at the rationale for the technique of meta-analysis by discussing 1) the role of integrative research reviews, 2) what meta-analysis is, and 3) the limitations of traditional narrative reviews. The next section of the chapter will critically analyze meta-analysis by examining 4) the strengths and limitations of meta-analysis in relation to the major stages involved in conducting a meta-analysis and by arguing for 5) a redefinition of meta-analysis that involves both quantitative and qualitative reviews of research.

INTEGRATIVE REVIEWS

Jackson (1980) points out that research reviews are a fundamental activity in the social sciences but that the focuses and purposes of such reviews vary considerably. Some reviews are primarily focused on summarizing new substantive and/or methodological developments in a specific field. Others are interested in verifying existing theories or developing new theories, while still others are interested in synthesizing knowledge from different fields of research. Integrative reviews, however, are those reviews that are focused on inferring generalizations about substantive issues from a set of studies which directly studied those issues.

While integrative reviews are seen as playing a vital role in educational research, there is not agreement over what that role is. Cooper (1982) believes that the role of integrative reviews is to define the state of knowledge. The goal is to summarize the accumulated state of knowledge concerning relations studied and the important issues unresolved by the researchers. Others, such as Cook and Leviton (1980), believe that the research review should establish "facts"; the dependable relationships that are found across a variety of studies despite any biases that may exist within individual studies. Whether research reviews are seen as establishing truth or giving a state of the art, it is clear that they play a major role in educational research. Olkin (1984) argues that no single study can deal with the complexity of educational problems and so reviews are needed to integrate a large number of studies on the same problem in order to begin to deal with that complexity.

META-ANALYSIS

Glass, McGaw and Smith (1981) point out that in the past narrative reviews were able to synthesize research related to any one topic because there were so few studies in one area. In the last twenty years, however, there has been a tremendous growth in the number of studies and the chronological verbal descriptions of research which have been used to integrate studies narratively have become inadequate. Researchers have begun to make crude representations of the findings which have often been misleading.

Glass, in his 1976 AERA presidential address, proposed a new technique, called meta-analysis, which he felt would better meet the needs of research integration today. He noted that the findings of multiple studies should be regarded as a complex data set that is no more comprehensible without statistical analysis than the hundreds of data points in a piece of primary research. Glass (1976) called for an approach to research synthesis that used the same standards of rigor expected of primary research. Rather than reviews being narrative and rhetorical, Glass' proposal was to use meta-analysis so that reviews would be more technical and statistical.

Meta-analysis is described by Glass (1976) as an "analysis of analyses." He defines it as a statistical analysis of a large collection of findings from individual studies for the purpose of integrating the findings. Glass (1976) believes that meta-analysis can provide a way to portray multiple findings quantitatively and aggregate these findings across potentially irrelevant distinctions. The purpose of meta-analysis, according to Glass, is to discover knowledge by summarizing studies in such an orderly way that knowledge can be extracted from the individual studies.

Jackson (1980) states that Glass' meta-analysis involves transforming the findings of individual studies into a common metric, coding the various characteristics of these studies, and then using standard statistical procedures to determine the overall effects, subsample effects, and the relations between the characteristics and the findings. Glass, McGaw and Smith (1981) see the essential characteristics of meta-analysis as: 1) quantitatively synthesizing the findings of studies related to a common problem area; 2) looking at all the research related to the problem area; and 3) aiming at generalizations. The statistic used to quantitatively synthesize the findings of the studies is the gain effect size. This score is figured by taking the difference between the treatment mean and the control mean and dividing it by the standard deviation of the control group. (Glass, 1978)

FIGURE 1: STATISTIC FOR GAIN EFFECT SIZE

$$\text{Gain effect} = \frac{\text{Treatment mean - control mean}}{\text{Standard deviation of control group}}$$

LIMITATIONS OF TRADITIONAL NARRATIVE REVIEWS

One of the strengths of meta-analysis, according to proponents of the technique, is simply that it is an improvement over the narrative research review. Glass (1978) believes that narrative reviews are subjective and often pure speculation while meta-analysis is objective and systematic. He sees it as a rigorous alternative to the casual, narrative discussions of research studies.

Cook and Leviton (1980) point out some of the problems with the traditional narrative reviews. They note that these reviews often are biased in their sample of studies because of a narrow literature review, the exclusion of studies on methodological grounds or due to theoretical constructs, and the use of narrowly defined constructs. Many narrative reviews fail to take into account statistical interactions that exist in studies and ignore important information on the magnitude of relationships and directions. Cook and Leviton argue, however, that these problems are the results of poor practices rather than inherent problems in the narrative reviews themselves.

Cooper and Rosenthal (1980) did a study in which they had forty people use either narrative or statistical review techniques on the same seven studies. They found that those doing the statistical reviews showed increased support of the perceived hypothesis and for the estimated magnitude of the relationship. Those doing the narrative reviews tended to be overly conservative and either ignored the statistics or combined them in an intuitive fashion. They also noted that the narrative reviews were responsive to the biases of the particular reviewer, neglected large amounts of information in the reports, and imprecisely weighted the conclusions.

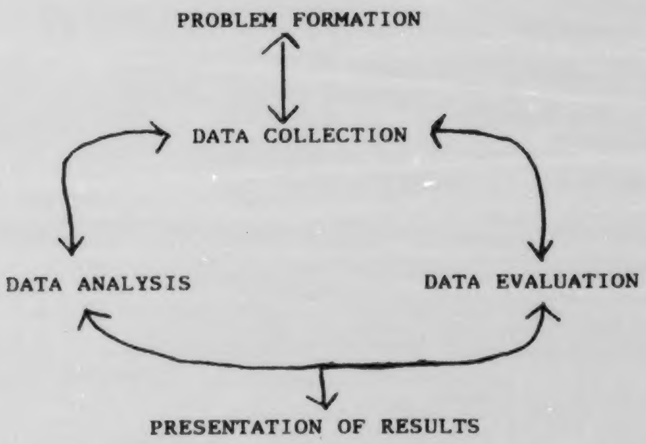
Jackson (1980) did a survey of thirty-six published narrative research reviews and also came up with critical comments about these reviews. He found that the reviewers often did not critically analyze or use the findings of past reviews on that same topic; that the studies reviewed were only a subsample of what was available, were not a representative sample and that there was no discussion of how they were chosen; that crude and misleading representations were used to combine the findings; there was a failure to systematically assess possible relationships between characteristics and findings of studies; and that the methods used to do the review were not discussed by the reviewers. Jackson (1980) concludes that narrative reviews lack rigor and standardization and result in few trustworthy conclusions. He argues that the lack of explicit methods for research reviews makes it difficult to judge the quality of reviews, to train graduate students in how to do reviews, and to accumulate valid knowledge from previous research.

Light and Smith (1971), as well as Hedges (1984) and Olkin (1984), talk about the inadequacies of past methods of combining the results from studies. The quantitative method that is most commonly used and which is often referred to as a "crude representation" is the box score or voting method. This consists of classifying each study according to whether or not the study found statistical significance. Each study is scored as either having positive significance, negative significance, or no significance and the "votes" are counted up in each column after scoring all the studies. Problems with this technique include the fact that it ignores sample size and so can be biased in favor of large studies with weak results and that it does not take into account the magnitude of the relationship. It also omits those studies where a relationship went in a certain direction but was not statistically significant. Both Hedges (1984) and Olkin (1984) point out that this test does not have much statistical power and that the probability of error actually increases as the number of studies included increases. This test is biased toward a modal finding of no statistical significance and ignores statistical interactions.

One other method that has been occasionally used is to take all of the significance tests and combine them into one test of the null hypothesis. The problem is that there is such a large N that this approach results in the rejection of the null hypothesis in almost all instances. (Hedges, 1984)

The movement toward quantitative meta-analysis is thus a recognition of the inadequacy of traditional narrative methods of research synthesis in the wake of the sheer number and complexity of educational research studies. The current interest in meta-analysis has resulted in the technique becoming the focus of a debate over whether it is a passing fad or an integral part of research methodology. The next section of this chapter will look at this debate by discussing the strengths and limitations of meta-analysis. This discussion will focus on the major stages involved in meta-analysis and the controversies involved at each particular stage. These five stages are those discussed by Cooper (1982) as characterizing the research process of integrative reviews: 1) problem formulation; 2) data collection; 3) data evaluation; 4) data analysis and interpretation; and 5) presentation of results.

FIGURE 2: THE FIVE STAGES OF INTEGRATIVE REVIEWS



PROBLEM FORMULATION

The first stage in quantitative meta-analysis is that of formulating the problem or area that will be the focus of the integrative review. Glass, McGaw and Smith (1981) point out that a major strength of meta-analysis is that is allows the conceptual and operational definitions to be broadly defined so that a larger domain of research can be included in the research review. They maintain that employing broad conceptual definitions gives greater validity and the potential for more definitive and robust conclusions. Even if the problem is more broadly defined in a narrative review, the reviewer runs into the problem of cognitive overload because of the sheer number of studies being dealt with. (Cook and Leviton, 1980).

It is extremely important, however, in setting up a broad definition of the construct, that provisions are made for making important distinctions between studies. Attention must be paid to study details so that important distinctions are not missed. If the categories are too broad, differences between studies are cancelled out. Cook and Leviton (1980) maintain that the use of broad definitions of constructs leads to a disregard for theoretical relevance and a vulnerability to misleading inferences. The taxonomy developed for coding the data in stage three of the review process determines the amount and kinds of distinctions retained between studies. The problems associated with developing a taxonomy that maintains a balance between retaining important distinctions between studies and making too fine of distinctions will be discussed under stage three, the evaluation of data.

Bittle (1984) points out that meta-analysis assumes that simple relationships exist between the terms, concepts and operations used in research. He feels that while the technique works adequately when dealing with fairly concrete variables such as class size, there are problems when it tries to deal with more abstract areas such as intelligence where there is a great deal of disagreement over what the term means. We certainly found this criticism to be true for the term reading comprehension which was the focus of our meta-analysis. We included in our data base any research study that used reading comprehension as an outcome measure and so this brought into the data base a wide variety of studies and definitions of reading comprehension. There are about as many definitions of comprehension as there are research studies. The area of reading comprehension instructional research is very complex and, because it deals with instruction in classroom settings rather than only laboratory settings, it tends to be a much "messier" form of research. Our experience was that in order to use the technique of meta-analysis with reading comprehension, we needed to develop a complex taxonomy and, even then, constant problems came up with each new study as to how to code the important distinctions between this study and others already in the meta-analysis.

DATA LOCATION AND COLLECTION

The second stage of meta-analysis is that of locating and collecting the data. Glass, McGaw and Smith (1981) stress that an exhaustive search needs to be done to locate all the relevant published and unpublished research in that area. All kinds of both primary and secondary sources need to be used in order to locate as much research as possible. Glass (1978) feels that this is the stage where the most serious form of bias can enter. A validity threat exists in relation to whether the retrieved studies differ qualitatively from all studies in a particular area. Glass (1978) calls for thorough descriptions of procedures used to locate studies so that readers can assess the representativeness and completeness of the data base.

Glass, McGaw and Smith (1981) looked at nine meta-analyses that included both published and unpublished research and found that the average gain effect size for published studies was higher than the average gain effect size for unpublished studies. Therefore, if the meta-analysis does not include unpublished work, it will be biased in the direction of positive results and so produce misleading generalizations.

There is relatively little disagreement over Glass' assertion that a very thorough search needs to be done to find as many studies as possible on a particular topic. The disagreement comes as to whether all of the studies which are located should go into the meta-analysis. This issue will be discussed in the next stage.

A problem that our team ran into during this stage of the meta-analysis was the extreme amount of time involved in doing the kind of search needed, especially in locating unpublished studies. Enormously more personnel and time were involved than had ever been anticipated. The descriptors used in standard indexes such as ERIC were not satisfactory for the type of search needed and so many hand searches had to be done of journals and bibliographies. This stage in the meta-analysis was both time-consuming and expensive in order to do the kind of thorough search advocated by Glass. The team also continually felt the frustration of knowing that not all the studies, especially unpublished studies, were being located and not being sure whether the sample of studies in the meta-analysis was representative of the total population or was biased in some way.

DATA CODING AND EVALUATION

The third stage in meta-analysis is coding and evaluating the data. This is the stage at which the most controversy exists and where there are disagreements as to how to conduct a meta-analysis. This stage involves developing a taxonomy and coding form and making decisions about what studies to include in the meta-analysis.

TAXONOMY

Glass, McGaw, and Smith (1981) point out that both substantive and methodological features of studies should be coded. The substantive features are those characteristics specific to the problem being studied. The methodological features are more general and are related to such things as the research design, sample size, test reliability, randomness, etc. A taxonomy must be developed which includes both of these areas so that an analysis can be made of whether findings differ according to certain characteristics of the studies. This taxonomy must allow for a full, meaningul description of the findings. Glass (1978) supports making many distinctions and then later obscuring them when it becomes apparent that differences do not exist.

The taxomony is extremely important in determining what kind of interpretation will be possible from a meta-analysis. After examining a number of other meta-analyses in reading, our team concluded that their coding systems did not make fine enough distinctions between the treatments and were not theoretically based. An initial coding system was developed by examining 30 comprehension studies. However, this taxonomy was continually revised and categories added, revised and deleted as actual coding of studies continued. Despite the complexity of our taxonomy, we still ended up with a few categories that became "dumping grounds" for all kinds of studies. A great variety of studies were put into these categories and so it was difficult to make any kinds of generalizations about those categories. Since our taxonomy appeared to more finely discriminate between the characteristics of treatments than other meta-analyses, this would seem to be a major problem in these meta-analyses.

The taxonomy used in our meta-analysis was theoretically based both in determining the four major dimensions that each treatment was coded on (reader, processing, task and text characteristics) and in the subcategories arranged under each of the major categories. While this proved to be a real strength of our coding system and facilitated the kinds of interpretations that could be made from the data, other meta-analyses do not appear to have taxonomies which have this theoretical basis. One major problem with our taxonomy was associated with breaking a wholistic process into four major categories. These four categories can not be viewed separately from each other and yet the taxonomy attempts to separate out each category with the admonition that each category can only be interpreted in relation to the other three categories. All quantitative meta-analyses would seem to suffer from this same problem of separating out categories which don't really exist and which can really only be understood by their transactions with other categories.

Our team has felt that the taxonomy has been the real strength of doing the meta-analysis. It has given us a way to organize, synthesize, and evaluate a very large data base that would otherwise seem unmanageable. The development of the taxonomy is thus a very important part of the meta-analysis and will determine whether or not the meta-analysis adds to the field's understanding of the area being synthesized. Our experience also demonstrates that the taxonomy will continue to change as more studies are coded and that to determine the taxonomy "a priori" without making adjustments during the meta-analysis will limit the validity of the taxonomy. However, on the other hand, the continual refinement of the taxonomy requires recoding earlier studies and so the research team can get into a vicious circle of coding and recoding which could potentially never end unless decisions are made about what to recode and how many changes to make in the taxonomy after a certain point in the meta-analysis process.

VALIDITY

Glass, McGaw and Smith (1981) talk about several problems at this stage with validity and reliability. The validity of meta-analysis can be effected if the coders need to do a great deal of inference of the study characteristics in order to code the study due to incomplete reporting by some researchers. We found this to be a problem in reading comprehension research. We ended up writing to many researchers asking for missing information. Control groups, in particular, were not usually described and so we had to make inferences about what we thought they might be doing. For example, Weaver (1979) states that the control group remained in their classroom and received no treatment. Cartelli (1977) states that the control group received no special training other than that normally obtained in the LD classroom. No other information about the control groups is provided in either of these studies and so the coding team had to make an inference on what "normal" instruction is. In addition, we found that some journals published only short reports of research and that, because of this, the research reports were not complete enough for us to always be able to tell what was really happening in a particular treatment.

RELIABILITY

Under reliability, Glass, McGaw and Smith (1981) discuss the importance of interrater reliability. There needs to be consistency in how the coders are coding the different characteristics of studies. Stock, Okun, Haring, Miller, Kinney and Ceurvorst (1982) conducted a study of interrater reliability on a meta-analysis. They looked at the reliability of judgements in selection and acceptance of sources and of judging and coding decisions about study characteristics. They found that they were able to reach satisfactory levels of interrater reliability in all areas except for study quality. Our experience was also that this category was the one most open to the reviewer's bias of "Did I like this study?" rather than of explicit criteria.

Stock, et al. (1982) point out the importance of well designed and piloted coding forms, a detailed coding manual, coder training on the coding form and codebook, continual checks of interrater reliability followed by more training to deal with problems, and procedures to incorporate new coders. They also note that discussion among coders increases the quality of the coding. This last point is another one that our team found very important. The initial expectation had been that we would spend several sessions coding together and then that each person would code individual studies. What we found was that we needed to continue coding as a group for a long period of time and that even after that, each study needed to be checked with another person. This may have been partially due to the complexity of our coding system and to the great variation in the research being coded. While the numbers make the process look as if it is "hard science," our experience was that coding was a social construction of what we decided to look at and how we looked at it. We made decisions by social consensus. Glass sees meta-analysis as a very objective and systematic process while we found that the process was subjective and was socially negotiated and constructed. It seems obvious to us that someone else could not pick up our coding form and be able to use it in the same way that we have. While we would agree with Glass that meta-analysis is a systematic procedure, we did not find it as precisely systematic as Glass has purported in the literature.

Another aspect of coding that affects reliability is the change in the coders. We changed as coders a great deal in the process of coding. Decisions made after several months of coding were different from those made early in the coding and were based on the background of the research that had already been coded. This became very apparent when two new coders came into the team after four months and became very frustrated with the decisions that the rest of the team were having no problems making. They could not see the basis of these decisions and when pressed, we realized that they were based on that common background experience with past studies. The studies coded at the beginning have had to be recoded a number of times based on later decisions and it has become obvious that the system of coding will never stabilize completely - that up to the very end, we could continue to go back and make changes based on more recent coding decisions.

THE APPLES AND ORANGES CRITICISM

The most common and vehement criticism of meta-analysis is that it is comparing apples and oranges. Different definitions of the same construct, different populations, and different outcomes measures are all thrown together and critics argue that only studies which are alike in some respects should be aggregated. Glass' response is that meta-analysis is no different than mixing together the data from different people in primary research. (Glass, McGaw, and Smith, 1981) He argues that the only studies that need to be integrated are those that differ.

Gallo (1978), in particular, criticizes data in which effect sizes are computed from heterogeneous measures. Glass, McGaw and Smith (1981) respond that since the outcome measures are all related in some way to the construct, in the end they are all general measures of that construct. Glass believes that the type of measure should be coded and later compared to see if this has an effect on the gain effect size score.

In our meta-analysis, we decide to include all studies which assessed reading comprehension and so this involved a tremendous variety of studies. We attempted to deal with this diversity of studies by coding distinctions between studies. Our assumption was that in the next stage of data interpretation we would look at each of these factors separately as Glass suggests in order to see if they effected the results. However, as will be discussed in the next section, once we moved into data interpretation, we realized what an important issue the criticism of "apples and oranges" was.

THE PROBLEM OF POOR QUALITY RESEARCH

The second major criticism is that Glass advocates the use of poor quality research in reviews. This stems from Glass' recommendation that all the research be coded and that methodological decisions not be made "a priori." Eysenck (1978) claims that Glass is supporting low standards of quality for research and abandoning critical criteria for evaluating the quality of research. He maintains that only the findings from well designed studies should be included.

Glass (1978) points out that even imperfect studies can converge on a true conclusion and that he is judging the quality of studies. His position is that research quality should be coded and then looked at at the end of the coding to see if the effect sizes differ for poor quality vs. good quality research. If they do, then the good quality research should be given more weight. However, both Glass (1978) and Hedges (1984) note that in the meta-analyses that have been done so far, the quality of the study has had no or very little effect on the gain effect sizes. Glass (1978) feels that to make judgements "a priori" is to inject a serious source of bias since even though these decisions are being made on methodological grounds, personal bias often enters.

Others doing meta-analysis do not always follow Glass' dictum on this issue and do make inclusion decisions based on methodology. (Kulik and Kulik, 1982) Jackson (1980) points out that a problem with making this kind of decision is that most studies have some type of methodological problems and that these problems do not always cause bias. Harste (1984) also points out that most research, especially research done in classrooms, has methodological problems and that there are few "good" studies out there. Slavin (1984) notes that there are problems when a meta-analysis includes methodologically poor studies where the flaws have a systematic bias in a certain direction rather than a randomized bias as Glass assumes they do. He believes that the inclusiveness requirement should be removed and that meta-analyses should throw out studies with systematic flaws in order to prevent a serious potential bias

While our team chose not to exclude studies due to methodological problems and to code internal and external validity, it soon became obvious that many categories were being filled with studies that had weak internal and external validity. For example, we found that 95% of the studies used dependent measures developed by the researcher rather than standardized measures. There was very little pilot testing of these measures and no testing of their validity or reliability before using them in the research study. Paris and Jacobs (1984) report a study based on a meta-awareness interview in which they ended up throwing out a majority of the questions from the analysis because of various problems. This should have been done in a pilot study. These and other methodological problems such as durations of less than one week raised questions about the effect of research quality on the mean gain effect sizes. Less than 5% of all the studies coded in our meta-analysis received codings of both high internal and external validity.

THE PROBLEM OF RESEARCH STATISTICS

Another problem that our team encountered was the amount of research that could not be included in the meta-analysis because they did not have the right statistics. We coded only studies that included means and standard deviations and had a control group. This omits ethnographies, descriptive research, correlational studies, and many of the more complex multi-variate studies being done today. Glass (1978) does give transformation formulas for transforming F statistics, correlations, etc. into gain effect scores. However, these transformations are only estimates of the gain effect sizes and there have been no proofs yet of these transformations. It therefore seems risky to use transformations unless absolutely necessary and this is what our team chose to do, which then involved excluding a great deal of research from the meta-analysis and made it necessary to use other kinds of synthesis for this large group of studies. It also meant we could not know for sure how representative the group of studies included in the meta-analysis was of the entire body of research in reading comprehension. It cannot be assumed that the many studies excluded from the meta-analysis did not reflect distinct differences from those included in the meta-analysis.

Examination of other meta-analyses such as one done by Pflaum, Walberg, Karegianes, and Rasher (1980) on reading instruction methods indicates that they also had to omit studies because of the lack of inferential statistics and control groups. However, no discussion or analysis is made of the excluded studies and whether they would have changed the findings. Meta-analysis reflects a theoretical orientation that only accepts specific, quantifiable kinds of results and so a great deal of important scholarship is likely to be discounted if no other type of synthesis is made of studies excluded from meta-analysis. What is most commonly called "naturalistic" research is not amenable to quantitative meta-analysis and this research is currently growing in number and contribution to the field of language and education.

DATA ANALYSIS AND INTERPRETATION

This stage of the meta-analysis involves analyzing and interpreting the data that has been coded. In this stage the effect sizes are compared across the study characteristics and standard statistical procedures are used to make all kinds of inferences. The effect sizes from individual studies become the dependent variables in meta-analysis and the substantive and methdodolgical study characteristics become the independent variables. The effect sizes can then be combined into various kinds of aggregations based on these study characteristics. The effect sizes can serve primarily as description, or can be subjected to a full range of inferential statistical techniques. (Kavale, 1983)

NON-INDEPENDENCE OF GAIN EFFECT SCORES

A major controversy at this stage is what to do about the fact that each study contributes more than one gain effect score into the meta-analysis. Since meta-analysis is conducted on large data sets in which multiple results are derived from the same study, the data are not independent from each other and give a mistaken impression of the reliability of the results. Our experience was that some studies put in 60 or more gain effects scores while other studies contributed only 5 gain effect scores and that the average was around 11 gain effect scores per study. This gives unfair weighting to certain studies and allows one study to dominate an entire category and the conclusions being drawn from that category. There are several proposals of how to deal with this issue. Some meta-analyses simply ignore this criticism and proceed as if each finding were independent of the other findings while others average out all the findings within a study up to the level of the study and then proceed with the meta-analyis with "studies" as the unit of analysis. Glass (1978) recommends using Tukey's jackknife method as a way to take account of the interdependencies. Our research team has also discussed the possibility of going back to each study and choosing one or two gain effect scores from each study which are representative of the major focus of that study.

EQUAL BIAS

Cook and Leviton (1980) point out that the problem of equal bias is a major consideration at this stage. They maintain that the use of effect scores assumes that there is equal bias across studies. This means that biases that inflate a relationship in one direction in some studies are counterbalanced by equally potent biases in the other direction in other studies. Others assume that the degree of bias can be estimated validly and that the studies can then be weighted to remove the bias. Bittle (1984) also argues that the use of inductive statistics assumes that the reviewers are dealing with an unbiased sample when this is not true. Any sample relects the methods, subjects and context of the study. He gives the example of the bias introduced by the fact that early research was all done with white, middle-class classrooms.

Hedges (1984) maintains that before effect sizes can be compared there needs to be a test for homogeneity to see if the effects are consistent. He sees this as a way to deal with the "apples and oranges" criticism. He wants to make sure that important differences among outcomes between studies do not exist before proceeding with comparisons of gain effect sizes.

Cook and Leviton (1980) also criticize Glass because he focuses primarily on global summary statements rather than on interactions. They feel that Glass tends to bias the analysis towards examining methodological characteristics rather than theoretical variables. This may be due to the fact that potential interaction variables of theoretical interest are not included in the taxonomy and so are not part of the data base.

USE OF INFERENTIAL STATISTICS

In addition, a major problem at this stage of the meta-analysis is the fact that proofs do not exist which demonstrate how valid the use of inferential statistics is with gain effect scores. It is at this point that the "apples and oranges" criticism becomes significant. Our experience showed that we came up with average gain effect scores for subcategories that were virtually meaningless because of the diversity of studies whichwe knew were in a specific category. Studies were in a category such as inference which defined inference differently, used different techniques to teach inference, had various kinds of methodological problems, and used different kinds of dependent measures. Knowing that the category of inference has a specific mean gain effect score, therefore, does not mean anything unless one looks closely at the studies that went into that cell.

LACK OF STANDARDIZATION OF CONTROL GROUPS

Another major problem with the use of mean gain effect scores as a way to compare studies and categories is that gain effect scores are based on the assumption that control groups are standardized. Gain effect sizes are calculated by taking the difference between the treatment mean and the control mean and dividing it by the standard deviation of the control group. However, control groups differ a great deal from study to study. In some studies, such as Hansen (1981) a control group exists which reads the same materials as the two treatment groups but does not receive that part of the treatment dealing with the focus of the study, inference. In other studies, such as Adams, Carnine, and Gersten (1982), we are told only that the control group stayed in their classrooms during the training, and so we have no idea on how many different dimensions the control group differed from the treatment group. In still other studies, such as Garner and Anderson (1981), there is no true control group but instead there are three treatment groups, one of which serves as a control for the others.

A true control should vary from the treatment only in relation to the manipulated variable and this was not true of many of the control groups that we coded. This meant that the comparison between the control and the treatment sometimes gave unfair advantage to the treatment group. It was also then misleading to compare gain effect scores between studies which used very different kinds of control groups because of the effect of the control group on the size of the gain effect scores. The closest thing to a standardized control group across studies would be what some researchers call "regular basal instruction." However, it is difficult to know what is always meant by this phrasing and there are many studies in which what the control group does differs considerably from "regular basal instruction." This problem with control groups is not discussed in the literature on meta-analysis and we found it to be a serious problem - one which shook our confidence in making much use of gain effect scores as inferential statistics.

USE OF GAIN EFFECT SCORES IN DATA ANALYSIS AND INTERPRETATION

Our experience with gain effect scores was thus to use them cautiously and with reservation. We have tended to use them at a very global level and not to have much faith in them in comparison between specific subcategories. Therefore, while we feel we can comment on the overall gain effect sizes from the four major categories, we get uneasy when trying to compare gain effect scores between specific subcategories such as inference or vocabulary. The gain effect sizes have also been helpful in looking at the effect of certain kinds of methodological decisions such as the changes in gain effect sizes based on length of the study, the use of standardized vs researcher generated dependent measures, etc. Another major problem was knowing how to determine how much difference there needed to be between gain effect sizes to know that one gain effect score was significantly higher than another. Does having one gain effect score being twice as high as another mean that that category or treatment is twice as good and has double the results of the other category? We worked with a number of different ways of comparing gain effect scores between categories and were not able to find any that we felt completely comfortable with. Whether or not a difference was important depended on what was included in the categories and a multitude of other factors.

Taking a large gain effect size as an indicator that a certain treatment or category is better than another treatment or category can be very misleading. For example, we found that studies which received a low internal validity rating had higher gain effect sizes; that studies which looked at lower levels of linguistic units, such as sentences rather than texts, had higher gain effect sizes; that researcher-made materials, which often were manipulated materials that one would not use in the classroom, received higher gain effect scores than commercial materials; that researcher developed dependent measures received higher gain effect sizes than standardized dependent measures; and that high internal consistency between the dependent measure and the treatment resulted in higher gain effect sizes for treatment groups and low gain effect sizes for control groups. This suggests that sloppily done research or purposively manipulated research can result in higher gain effect scores than in carefully controlled experimental studies where the researcher has taken steps to lessen the effects of bias on the results.

FIGURE 3: HIGH GAIN EFFECT SCORES

Low internal validity + short linguistic units + researcher materials + nonstandardized dependent measures + high internal consistency with the treatment = high gain effect scores

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Therefore, our team found that using the gain effect scores as a way to analyze and interpret the data was not valid except perhaps in looking at very broad categories and methodological variables and in indicating which categories needed closer examination. However, the taxonomy did provide a very useful tool for getting hold of major trends in comprehension research and providing a basis for synthesis papers which attempted to interpret both the studies included in the quantitative meta-analysis and in the syntheses done of studies excluded from the meta-analysis. Rowe, in chapter 7, for example, discusses three important general trends which emerged by examining the studies in the various categories of the taxonomy: that most comprehension research has come to rest on a theory of reading which acknowledges the active role of the reader; that there is a move towards comprehension instruction which focuses on higher levels of cognitive processing; and that readers are being encouraged through instruction to develop and become aware of strategies which they can apply in other reading situations. Important methodological issues, such as the finding that around 65% of the treatments done in comprehension had a duration of less than a week, were identified through examining the various categories of the taxonomy. Therefore, while we did not find the gain effect scores particularly useful or valid, the data coded into the taxonomy was extremely useful in making further qualitative analyses. This same taxonomy was used as a basis for examining studies which were excluded from the meta-analysis and this was helpful in looking at trends across the entire data base rather than only across the studies included in the quantitative meta-analysis.

REPORTING THE RESULTS

The last stage in a meta-analysis consists of reporting the results to the public. Based on the previous discussion of meta-analysis, it should be obvious that to simply present the results of a meta-analysis in a table which compares gain effect scores is inadequate. Pflaum, Walberg, Karagianes and Rasher (1980) report their synthesis of 197 reading methods studies in seven pages and two tables which give the mean gain effect size for each method. As argued in the above discussion on interpreting the results, the gain effect sizes by themselves really have no meaning. We have chosen to write a series of synthesis papers which attempt to discuss the major trends and insights gained from both the quantitative meta-analysis and the qualitative syntheses rather than issuing a series of tables of gain effect scores.

Slavin (1984) states that the report of a meta-analysis should include a good discussion of the major studies on which it is based. The effect sizes should not be treated as primary data and the researcher describe only the study selection and statistical procedures as in the Pflaum et al. study. The studies included must be discussed just as thoroughly as in traditional reviews. He contends that if the studies are not discussed, we are forced to throw away the information we need to know as scholars in order to determine whether we should pay any attention to the findings.

A report of a quantitative meta-analysis must therefore include a detailed description of the choices made at each of the previous five steps, a list of the research which is included in the data base and a discussion of at least some of the studies included in the data base.

A REDEFINITION OF META-ANALYSIS

While proponents of quantitative meta-analysis criticize the limitations of traditional narrative research reviews, the discussion of meta-analysis in this chapter has pointed out that it also has many limitations as well as strengths. What proponents of meta-analysis have often ignored is that narrative reviews have strengths as well as limitations. Light and Pillemer (1982) argue that qualitative information is equally as important as quantitative information for explaining conflicting or puzzling outcomes and they discuss six ways in which qualitative information is essential in integrative research reviews: 1) the importance of documenting the process aspects of each treatment as well as the statistical outcome and of documenting different subject groups who are all aggregated together in the gain effect scores but for whom the treatments may have had differing outcomes; 2) the context in which a program operates is sometimes much more important than the test scores or outcomes of the study; 3) qualitative information is needed when studies are aggregated across different levels or units of impact in order to understand the differing effects at each level; 4) subtle differences often exist between treatments or control groups that are supposedly the same and therefore it is important to have a description of what actually happened to students in these groups in a study; 5) sometimes the success of a treatment is explained by features of the program apart from the original treatment and qualitative data can provide clues to a different feature of the treatment that is more important than the original planned treatment; 6) qualitative information is important for those who use integrative research reviews in making policy decisions.

Light and Pillemer (1982) maintain that research reviews need to be both quantitative and qualitative. They believe that qualitative reviews add the dimensions of contextual richness and quantitative reviews add a way to systematically look at a larger amount of data. Their proposal is that both quantitative and qualitative methods be used such that quantitative methods are used to detect differences and qualitative methods are used to explain and evaluate those differences. If reviews are organized to ally both forms of information, they believe that this will mazimize our knowledge about a particular area of research and make those reviews more useful to teachers and researchers. The complexity of current research plus the sheer numbers of studies make both types of information crucial to an understanding of any area of study.

This chapter has pointed out the strengths and limitations of narrative reviews and quantitative meta-analysis through reviewing the literature on narrative reviews and meta-analysis and discussing our own experience with utilizing the technique of meta-analysis. Based on the issues discussed in this chapter, our research team came to the same conclusion as Light and Pillemer on the need for both quantitative and qualitative reviews of the research.

Initially, we were content to retain the traditional definition of meta-analysis and to call it one way to synthesize research which must be supplemented by other techniques of qualitative synthesis. However, it became increasingly obvious that quantitative meta-analysis by itself was not only inadequate and minimally useful but also misleading when divorced from the qualitative syntheses. Therefore, it seems important to argue for a redefinition of meta-analysis to include both quantitative and qualitative syntheses to ensure that the two types of data and data analysis are always interpreted and synthesized in conjunction with each other. Unless meta-analysis is expanded to include both qualitative and quantitative syntheses, some researchers will continue to only use the quantitative synthesis. Surveys of the landscape will be misleading and our journeys through the landscape will be unproductive. In fact, we may spend a great deal of our time lost on that landscape because of a partial and misleading survey of the landscape.

Another argument for redefining meta-analysis is found in the Oxford Dictionary defintion of the prefix "meta." It refers to meta as meaning objective, systematic reflection and critical speculation and reflection. Defining meta-analysis as Glass does only takes into account the first half of this definition while our proposed redefinition of meta-analysis allows for both the objective and systematic reflection through looking at gain effect scores and the critical speculative reflection through qualitative analysis of the studies.

Meta-analysis is not an objective and rigorous technique to use in uncovering truth. We didn't arrive at truth in our meta-analysis but then neither does other research. We found that, just as with all research, meta-analysis is a social construction that is limited by what we currently know and believe. It is important that we acknowledge this subjectivity rather than proceeding as if the use of numbers makes meta-analysis any more "objective" than the narrative reviews that Glass puts down as speculation. However, just because we can't objectively aggregate information or people does not mean that quantitative meta-analysis is not useful, especially when used in conjunction with qualitative meta-analysis.

IMPLICATIONS FOR TEACHERS AND RESEARCHERS

As readers of the many meta-analyses currently being published, both teachers and researchers need to view with skepticism those syntheses that only report mean gain effect scores. As argued above, without knowing the context within which the studies were conducted, the information needed to determine the value of the findings is lost. Because of the "apples and oranges" issue, it is difficult to know what a mean gain effect score means when one has no idea of the diversity of studies that that score represents. As mentioned earlier, we found the mean gain effect scores to be of limited usefulness except to look at very broad categories and methodological variables and to indicate which categories needed closer examination. The reader of meta-analyses need to evaluate whether or not there has been an overreliance on quantitative synthesis without the support of the qualitative data. There also needs to be a complete description of decisions made at each step of the meta-analysis. The decision, for example, of what studies to include in the data base, can have a major effect on the findings and bias the findings depending on how that decision was made.

Those who are considering doing a meta-analysis need to look at the various issues raised in this chapter and decide how they will deal with them. We have argued here that those considering doing a meta-analysis need to expand their definition of meta-analysis to include both quantitative and qualitative syntheses. There are simply too many limitations involved in using only the quantitative analysis which limits its usefulness in having anything of significance to say to other researchers and teachers.

Both readers and users of meta-analysis need to keep in mind that it is not an objective means of uncovering truth. What meta-analysis does provide is a good state-of-the art of current beliefs in a particular area. It gives an excellent sense of what kind of research is being done and where the limitations and holes are in that research. Those involved in meta-analysis gain an indepth base or theoretical frame for a more critical look at a particular area of study. It 1) forces us to deal with what exists in a particular field and 2) points out directions for change. It 3) allows us to see relationships broader than the topic being looked at and 4)to reach conclusions about trends that are broader than the individual studies.

Meta-analysis is not, however, a way to get at truth or facts. As one team member put it, we arrived at "consistent subjectivity" through concensus. Meta-analysis is thus another way of knowing, another perspective on how to integrate a large body of research. However, the stress is on meta-analysis as another way of knowing, not the only way of knowing. The debate on meta-analysis is not on whether to use quantitative rather than qualitative reviews but on what new perspectives meta-analysis can offer to the process of integrating research in order to better understand where we currently are in a particular area of study.

While meta-analysis gives an understanding of the set of current beliefs within a field of study, it does not encourage evaluation of those beliefs. Both reflection on current beliefs and evaluation of those beliefs are needed to move our fields of study along. Meta-analysis is not likely to generate new ideas because of its emphasis on synthesizing what is already known and its positivistic search for causal relationships. It does point us, however, toward directions for change based on a better understanding and an evaluation of what we currently believe.

CONCLUSION

We have before us a vast and partially charted landscape. Meta-analysis offers us a way to go about surveying that landscape. Both the literature on meta-analysis and our experience with it as a tool for integrating research findings indicate that to define it solely as a quantitative technique eliminates valuable information which is needed in order to give the findings meaning. If we want our surveys of the landscape to better reflect that landscape and to help us more productively continue our journeys through that landscape, we must redefine meta-analysis to include both qualitative and quantitative syntheses.

As you continue reading the following chapters in this book, you will see how we have integrated both the qualitative and quantitative syntheses to support each other. In the following chapter, Row and Harste will give a more indepth look at the plans and procedures involved in the various stages of the meta-analysis, especially in data collection and identification and in data coding and analyis. In Chapter 4, Rowe will focus in on the results of the quantitative meta-analysis using the five steps discussed in this chapter. She will discuss in more detail what we did in our meta-analysis under each step, findings from the quantitative portion of the meta-analysis, and the strengths and limitations we found in quantitative meta-analysis.

Chapter 2

SURVEYING THE LANDSCAPES: PLANS AND PROCEDURES FOR THE RESEARCH

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INTRODUCTION

Recently much attention has been directed to the state of education in our nation, and literacy, as a primary goal of schooling, has usually been in the limelight. Whether or not we accept the findings of reports which claim that literacy in our nation is declining (e.g. A Nation at Risk) or agree with other experts who contend that these statements are overly dramatic (Farr,Courtland, & Beck, 1984), it is clear that among students labeled as "handicapped" learners, reading problems are a major factor in school difficulty. For those of us intimately involved with the teaching of reading, it is also apparent that the reading programs usually used with these students emphasize skills such as word identification and vocabulary but place less emphasis on promoting comprehension. Since "making meaning" is what reading is all about, there is a need to somehow refocus our instruction to help students improve their reading comprehension.

In this chapter we will describe the federally funded research project which is being conducted at Indiana University with the goal of improving reading comprehension instruction for special learners. Specifically, the contract we have been working under for the last year requires that our research:

> " involve an analysis and synthesis of both basic and applied research, the examination of current school practices related to program development, and the discovery of approaches for improving instructional strategies and identifying teaching techniques for promoting reading comprehension with handicapped studients." (RFP 83-026, 1984-85).

The second phase of this two-year project, which involves observing reading comprehension instruction in classrooms serving handicapped students, is currently underway. But the first phase of this project, the meta-analysis of existing comprehension research, is already complete and serves as the basis for each of the chapters in this book. Regardless of whether you are primarily interested in reading comprehension instruction as a classroom teacher, a teacher educator, or a reading researcher it is important that you understand where and how we have gathered the information and formed the opinions expressed in Chapters 3 through 12. Our research expedition into the field of reading comprehension has surely been a highly personal experience, with each member of the team developing perspectives colored by the research paths we have chosen as well as the companions with whom we have traveled. Together, the chapters of this book form a kind of of travelogue of the experiences of our research team over the past year. Each author presents the team's consensus about what we have seen and come to understand--but from his or her own unique vantage point in the process.

The purpose of this chapter is to map the contours of this large and sometimes overwhelming research project. In order to do this we will present an overview of the completed meta-analysis as in Figure 1, and a kind of natural history of how the research was conducted. Basically, in this chapter we will address the "how" of this research, and leave the reporting and discussion of results to the chapters which follow.

It will soon become clear to you that our research path has not been a one-way trip from data collection, to data coding, to data analysis, to reporting our findings. Instead, these phases have often co-occurred, and we have often been forced to revisit already covered territory. This has required new decisions which have affected the rest of the mental trip we have taken as researchers. We feel this recursiveness has been a major strength of our study, but it does not make the reporting of the research process neat and easy. So in the sections which follow we hope to provide information about our decisions and procedures which will allow you to both understand the research process used in this meta-analysis, and to evaluate our conclusions in light of the strengths and weaknesses of the path we traveled in reaching them. To that end we will focus, in turn, on the four methodological issues which seem most crucial for understanding and evaluating a research synthesis: (1) the overall plan of the research, (2) data identification and collection, (3) data coding, and (4) data analysis.

OVERALL PLAN OF THE RESEARCH

When we began this project our plan was to use quantitative meta-analysis to synthesize the results of those studies reporting appropriate data (means and standard deviations of treatment and control groups) and then to produce a more traditional narrative review of studies not amenable to quantitative meta-analysis. We naively assumed that a majority of the reading comprehension studies we located would fall into the former category. Therefore, we focused our attention first on studies which could be included in the quantitative meta-analysis. Though the assumption proved to be faulty, in the present context this decision is important because it helps to explain why we sequenced our research tasks as we did, and provides a frame for understanding how the research progressed over time.

DATA IDENTIFICATION AND COLLECTION

We found that identifying, to say nothing of summarizing, what is currently known about reading comprehension is not as straightforward a task as it may initially appear. Two immense problems were encountered. First, we had to identify everything that should be identified and then locate this information in published sources such as journals and books, and in unpublished sources such as dissertations and manuscripts solicted directly from researchers. Operationalized, a review of this size means searching a variety of sources for candidate references, selecting those that are truly appropriate (e.g. sorting reading comprehension articles from other types of reading articles), physically locating copies of these studies, and then sorting studies of reading comprehension instruction from psychological studies of reading processes where applications to practice are less clear. Supposing, of course, that we could adequately manage these tasks, a further phase would have to involve synthesizing this mass of information in some meaningful way.

By consulting CARS, a master library indexing system which includes Books in Print, Dissertation Abstracts, Psychological Abstracts, ERIC holdings and other indexing systems, we discovered that some 37,000 articles qualified as potential candidates to be included in a review of this sort. To make this task manageable we took a survival-of-the-fittest view and rationalized that ideas, like species, would survive across time if and only if they were healthy. This position meant we concentrated our search on the last 10 years and included research older than this only if it was cited by at least 3 different authors, excluding an author citng his or her own work.

A search by hand of 10 of the most important journals reporting reading research was done to check on the reliability of the CARS/ERIC system. ERIC seemed to include a wide variety of unpublished work, but listed only 37.5% of the published articles we had identified. Additionally, we checked the reference list of every pertinent article against our master bibliography, and then subjected any previously unidentified citations to the cycle of determination of relevance, location, and categorization. Conducting hand searches of major journals and examining the bibliographies of articles already selected for inclusion plus the use of ERIC printouts proved the most effective way to proceed given our purposes.

In practice we reduced the 37,000 "reading" articles identified by ERIC to a subset of 5,000 for which "reading comprehension" was a descriptor. These articles were physically located, copied, and examined by a member of the research team. See Figure 1 for a visual display summarizing the data location and collection processes.

Whether or not we adequately covered journals which rarely publish reading research articles, like Elementary School Journal and Phi Delta Kappan is not known. More problematic, even, is whether or not our bibliography includes research articles published as chapters in books rather than as articles--a practice which, incidentally, seems to be on the rise.

A spot check of recent publications from the International Reading Association, the National Council of Teachers of English, Ablex, and Erlbaum suggested that we might miss up to 20% of the total number of articles which should have been included. To reduce this possibility, we sent letters to all National Reading Conference and National Conference on Research in English members informing them of our project and requesting that they send copies of any articles they thought we might have difficulty locating. Since it is difficult to determine how effective this approach was, we present our current efforts arguing representativeness rather than inclusiveness. However, we do want to point out that while some studies may have escaped our search, we have exhausted all of the possibilities of which we are currently aware to locate research on reading comprehension produced during the last 10 years.

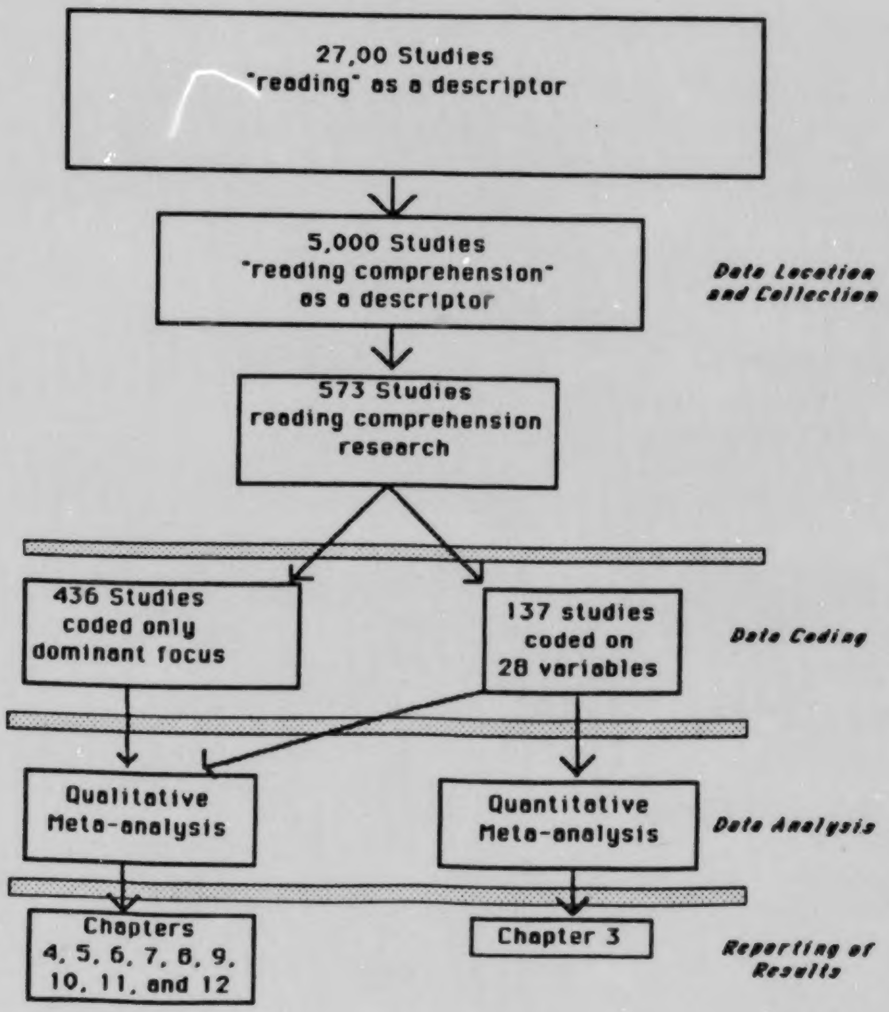
Of the 5,000 articles we tentatively identified as dealing with reading comprehension, only 573 met our criteria as being actual research on reading comprehension. The remainder fell into two groups: (1) articles which expressed opinions and theories about reading comprehension but did not report research, and (2) reading research articles which did not really focus on comprehension.

Of the 573 reading comprehension studies, only 137, about 24%, included sufficient statistical information (means and standard deviations of experimental and control groups) to be included in the quantitative portion of the meta-analysis. We are quite aware that the studies included in the quantitative meta-analysis are likely to differ in a number of ways from those synthesized narratively. For example, descriptive, ethnographic, and comparative studies (those comparing older and younger or more- and less-able readers) usually could not be included because they typically did not produce the needed statistical information. Also studies using qualitative measures, such as patterns of miscues or retellings, often were not amenable to quantitative meta-analysis.

This state of affairs, which we discovered only during the course of the study, has necessarily influenced the techniques which we have used to analyze the data. A quick glance at Figure 1 makes it clear that we have used qualitative meta-analysis techniques as a basis for the majority of the chapters in this book. This is not to minimize the interesting findings which we obtained through quantitative meta-analysis, but instead to state that we did not find this techniques as useful as we had initially hoped, both because it could not handle much of the existing research, and because it provided only the most general indicators of the effectiveness of instructional

Figure 1

MAP OF THE RESEARCH


27,00 Studies
"reading" as a descriptor
5,000 Studies
"reading comprehension" as a descriptor
Data Location and Collection
573 Studies
reading comprehension research
436 Studies
coded only dominant focus
137 studies
coded on 28 variables
Data Coding
Qualitative Meta-analysis
Quantitative Meta-analysis
Data Analysis
Chapters
4, 5, 6, 7, 8, 9, 10, 11, and 12
Chapter 3
Reporting of Results

techniques. The quantitative meta-analysis is discussed more thoroughly in Chapter 3.

DATA CODING: DEVELOPMENT AND USE OF THE TAXONOMY

To summarize studies which represent a diverse range of methodological and theoretical oreientations, we needed a coding system which would allow us to reflect this diversity in an organized fashion. To decide which codes should be included, we began by identifying major reviews in the field of reading. We chose these reviews based on their citation rates, starting this effort by building on the work of Guthrie and his colleagues (1983). Our summaries of these reviews focused on key variables, or patterns of variables, which the authors saw as important. To update Guthrie's lists we identified, via CARS, major reviews within the last 10 years. Much of this work was contained in books. No effort was made to read every review available. Rather, what we were looking for was a working set of variables that represented the field and from which we could begin.

When coding actually began, new studies frequently pushed the limits of the taxonomy, causing multiple additions and revisions. It is in the revision of the original taxonomy that the recursiveness of the meta-analysis process is most evident. It would have been impossible for us to devise, in advance, a taxonomy which would completely handle the existing data. Instead we found it necessary to allow new distinctions and categories to emerge from the data. An interrater reliability of .80 was set as a criterion level for purposes of deciding when a particular taxonomic category was adequately refined. Categories were explicated, defined, re-defined, and expanded until this criterion was met. Of course, each time we made alterations in the taxonomy, previously coded studies needed to be reexamined to reflect these changes. In a research review of this size, the recoding became a tremendous task. Each change required a team member familiar with the taxonomy to reread and recode the previous studies as well as to make the corresponding corrections in the computer data base. For this reason, after about three months of developing the taxonomy through use we made the practical decision to use the existing codes without changes. We completed the coding of the studies for the quantitative meta-analysis with this version of the taxonomy.

Later when we began the qualitative synthesis of the remaining studies we did make a few more changes in the taxonomy. These were necessary to fine-tune categories which we had initially defined too broadly, and to add codes to handle groups of studies which were not reflected in the quantitative meta-analysis data base. Though important, these changes did not alter overall character of the taxonomy. In all, we fine-tuned the definition of 3 subcategories, added 6 new subcategories, and deleted 3 categories which were infrequently used--making a total of 12 changes in a taxonomy which contained 161 codes. The taxonomy which resulted from this final revision is included as Appendix A. It includes:

(1) study information--(year of publication, number of comparisons, number of dependent variables);

(2) subject characteristics--(sex, race, income, achievement level in reading, grade level, handicapping condition, placement);

(3) methodological characteristics--(sample size, duration of study, internal validity, and external validity);

(4) experimental and control treatment descriptions--(materials used, linguistic unit featured, intent [examining basic psychological processes or testing instructional treatments], and the specific text, reader, task, and cognitive processing factors involved);

(5) dominant focus of the study--(text, reader, task, and cognitive processing); and

(6) characteristics of dependent measures--(kind, type, and level of linguistic unit tested, and internal consistency between the treatments and measures).

In coding the characteristics of treatments, the taxonomy allows simultaneous recording of the aspects of the text, task, reader, and processing strategies on which the researcher focuses. It also forces choice of one of these treatment characteristics as the dominant focus of the study.

Not only did the taxonomy change somewhat over time, but the coding process itself also changed as we became more consistent in our decisions about studies. During the initial period of taxonomy development the entire team read and discussed the coding of studies as well as the needed changes in the coding system. After the taxonomy was stabilized and each of us had considerable experience in coding, only two team members actually read each study. By the end of the project, the research team achieved an interrater reliability of .92. For all practical purposes, the figure was even higher than this, because all studies were coded by two team members and differences were discussed and arbitrated by a third coder before data was entered into the quantitative meta-analysis data base. We estimate that it took us on the average 10 person hours to identify, locate, copy, catalog, select, read, double-code, arbitrate, and validate the coding of each article actually entered into our synthesis.

Some simple calculation yields a figure of 1370 hours of work just to fully code the studies which contained data appropriate for the quantitative meta-analysis. There were times when we felt like those first cartographers who traveled across our immense continent on foot--over every new rise was an expanse of uncharted territory stretching as far as the eye could see. Though we slowly conquered the pile of studies for the quantitative meta-analysis it became increasingly clear that the majority of studies did not fall into this category. After the first eight months of the project, the coding of the 137 quantitative meta-analysis studies was almost complete, leaving, however, a tremendous amount of information uncategorized.

At this point, the team assessed the likelihood of completing the coding of the remaining studies on all 28 variables and synthesizing this information before the end of the year--a deadline set in the original contract. We determined that limitations in resources and trained personnel would prevent the completeion of the coding, and would probably also interfere with our stated goal of synthesizing this body of research. Therefore, we decided to approach the remaining studies with an altered coding plan. We first determined that the information we needed most in order to complete the narrative reviews was the dominant focus code for each study. This code identifies the reader, text, task, or processing strategy subcategory which is the primary focus of each study. This information would enable us to group studies with related research hypotheses for the purposes of identifying the most heavily researched areas, and synthesizing studies with similar implications for instruction.

Accordingly, we made an initial sort of the remaining studies based on a reading of their titles and abstracts. Team members were then assigned to carefully, but as quickly as possible, code only the dominant focus for each study. Table 1 represents one result of this effort by tabulating the dominant focus of all 537 reading comprehension studies by category. Readers interested in a full account of studies coded in each category are referred to the list of studies found under each hypothesis in Appendix B, and then to the complete bibliography in Appendix C.

Through these procedures we have amassed a tremendous amount of information on reading comprehension research. To summarize, our data base includes two sets of descriptive data: (1) a reliable coding for the 137 quantitative meta-analysis studies on 28 methodological and substantive variables, and (2) a tentative dominant focus coding for the 436 studies which had insufficient data to be included in the quantitative meta-analysis. Together these two data sets have permitted us to access groups of studies which address important aspects of reading comprehension, and to synthesize them using quantitative and qualitative meta-analysis techniques.

DATA ANALYSIS

As indicated above, the data analysis phase of this study used two types of techniques: (1) quantitative meta-analysis as defined by Glass, McGaw, &

Table I

Frequency Distribution of Studies by Dominant Focus

Code	Descriptor	N
TEXT		
101	Quantity (length)	2
102	Density (# of concepts/propositions)	13
103	Repetition of Concepts	50
104	Explicitness	20
105	Discourse Type (expository)	1
106	Writer's Intent	2
107	Syntactic Complexity	7
108	Semantic Repetitiveness	3
109	Cohesion	34
110	Organizational Structures	16
111	Propositional Structure (order)	2
112	Physical Appearance	13
113	Illustrations	10
READER		
201	Reader Response/Perspective	25
202	Schema Availability (knowledge of content)	24
203	Knowledge of Syntax	10
204	Knowledge of Genre	15
205	Learning Style	15
206	Risk-taking	1
207	Attitude	1
208	Interest	7
209	Flexibility	6
210	Apply Existing Strategies	48
211	Apply New Strategies	27
TASK		
301	Lesson Frameworks	29
302	Time	8
303	Functionality	1
304	Teacher Expectation/Behavior	12
305	Efferent (expository text)	8
306	Aesthetic	1
307	Individualized/Independent	6
308	Group/Social	1
309	Situational (large school program)	25
310	Cultural	3
311	Linguistic (cloze/maze)	7
312	Attitudinal	8
313	Perceptual/Motor	7
314	Modality	17
315	Rate	4
316	Reward	4
PROCESSING STRATEGIES		
401	Recall	23
402	Word Meanings	31
405	Identifying Text Structure	10
406	Inference	32
407	Schema Construction	4
408	Schema Maintenance	4
409	Schema Selection	2
410	Prediction	3
411	Macro-operators	13
413	Transmediation	15
414	Abduction	15

__Note__: The total number of categorized studies is 573; however, quantitative meta-analysis studies with more than one experimental treatment received a dominant focus code for each treatment. Therefore, some studies are represented more than once.

Smith (1981), and (2) more traditional qualitative meta-analysis techniques. As Figure 1 indicates, only about 25% of the data base was used in the quantitative meta-analysis, while the qualitative meta-analysis took the entire data base as its domain. Because the procedures and results of the quantitative meta-analysis are discussed in detail in Chapter 3, we will turn our attention here to the qualitative meta-analysis. In the remainder of this section we will describe the analysis procedures which have led to the reports of results in Chapters 4 through 12.

We followed two main paths as we approached the task of synthesizing information across the entire data base. After all the studies were coded by dominant focus, the frequency distribution of studies falling into each reader, text, task, and processing strategy category was examined. This information is displayed in Table 1. Beginning with this information, our research team began to focus both on uncovering global patterns across the entire data base (see Chapters 4 and 12), and on synthesis of specific information related to comprehension instruction (see Chapters 5 through 11).

Another task which included elements of both global and specific synthesis was our effort to identify the major hypotheses which had been tested during the 10 year period covered by our data base. Using the data in Table 1 together with our own reading of who was doing what, and for what purposes, patterns began to emerge. For example, we found that similar hypotheses were sometimes tested for quite different reasons. One example is Wilhite's (1984) experiment where he tests the effect of pre-passage questions as cues to schema activation--an hypothesis which posits an active reader sampling from textual cues. This orientation is quite different from earlier studies by Rickards (1976) and his colleagues which were founded on the behavioristic notion that adjunct questions could control readers' responses. This is only one of many instances where seemingly small differences in procedures can signal large differences in underlying assumptions.

Appendix B positively states the major hypotheses that reading researchers make relative to instruction in reading comprehension for each of the text, reader, task, and processing strategy categories on our taxonomy. As mentioned above, relevant studies are listed under each hypothesis and are identified by author and year as well as by data bank (quantitative or qualitative meta-analysis). Table 2 identifies and labels the patterns we found in these hypotheses.

Initial decisions on how to label the importance of each hypothesis in reading comprehension research during the last ten years were made by inspecting the frequency distribution of studies with a dominant focus in the corresponding categories. Codings, for the most part, reflect frequency though we did use the knowledge gained from reading these studies to temper

Table 2

Patterns in Hypotheses

Dominant (>)
NonDominant, Currently Evolving (#)
NonDominant, Future Directions (+)
Bridging ($)

Code	Hypothesis (see Appendix A)	Pattern(s)
TEXT		
101	Quantity (length)	$+
102	Density (# of concepts/propositions)	
103	Repetition of Concepts	>
104	Explicitness	>
105	Discourse Type (expository)	>$
106	Writer's Intent	+
107	Syntactic Complexity	
108	Semantic Repetitiveness	
109	Cohesion	>
110	Organizational Structures	>
111	Propositional Structure (order)	
112	Physical Appearance	+
113	Illustrations	>
READER		
201	Reader Response/Perspective	+
202	Schema Availability (knowledge of content)	>
203	Knowledge of Syntax	
204	Knowledge of Genre	>
205	Learning Style	
206	Risk-taking	+
207	Attitude	$
208	Interest	
209	Flexibility	#
210	Apply Existing Strategies	>
211	Apply New Strategies	>

Code	Hypothesis (see Appendix A)	Pattern(s)
TASK		
301	Lesson Frameworks	>
302	Time	
303	Functionality	$+
304	Teacher Expectation/Behavior	>
305	Efferent (expository text)	$>
306	Aesthetic	$#
307	Individualized/Independent	
308	Group/Social	$+
309	Situational (large school program)	>
310	Cultural	$+
311	Linguistic (cloze/maze)	
312	Attitudinal	
313	Perceptual/Motor	
314	Modality	>
315	Rate	
316	Reward	
PROCESSING STRATEGIES		
401	Recall	$>
402	Word Meanings	>
405	Identifying Text Structure	$>
406	Inference	>
407	Schema Construction	$>
408	Schema Maintenance	
409	Schema Selection	+
410	Prediction	$>
411	Macro-operators	>
413	Transmediation	>
414	Abduction	>

the data when they did not reflect our reading of the current state of knowledge in the field.

Some of the hypotheses listed in Table 2 and Appendix B have been coded Dominant, meaning they are the most frequently tested by researchers during the past decade. Others have been coded Nondominant, but Currently Evolving, meaning that quite recently key researchers in the field have begun exploring these hypotheses. This second set of hypotheses represents what some reading researchers, at least, believe to be new directions.

Still another set of hypotheses have been coded Nondominant, but Likely Future Directions. At the current moment there are few studies in these categories, yet they represent what we see as a shift in perspective, a new direction, an attempt to test the thinking of key theoreticians in the field. Together with the previous category these studies represent what the research team believes to be future trends in the field.

A fourth set has been coded as Bridging, meaning that while these hypotheses are still being tested, they are rarely the dominant focus of studies. Because researchers test these hypotheses in a variety of ways, they are assigned to a number of different categories, given our coding scheme. The first type of Bridging hypothesis is illustrated by Hypothesis 105 which deals with the use of content area materials in reading instruction. Only one study has been coded as having a dominant focus in this category; however, many studies make use of content area materials in the process of testing other hypotheses. This type of Bridging hypothesis seems to have achieved a taken-for-granted status in the field, that is most researchers generally agree that students must be exposed to content area texts in addition to stories. An example of the second type of Bridging hypothesis is 405. In this case, several coding categories reflect students' abilities to identify elements of text structure. Therefore, this hypothesis, written to correspond to processing strategy category 405, is also supported by many studies coded in reader category 204 which deals with knowledge of text structure. While these studies were originally separated depending upon whether the researcher focused on the reader's existing knowledge or the process of using that knowledge, there is an important relationship between the categories which we are noting by the use of the Bridging designation.

A fifth set, essentially uncoded in Table 2 and Appendix B represents hypotheses being tested, but neither dominant nor abandoned. Many of these hypotheses represent the thinking of the preceding decade. In some instances they were found wanting. Typically they represent hypotheses believed not to be as fruitful for advancing the field at this moment in our intellectual history.

Dominant and Bridging categories represent "normal science" during the last decade. NonDominant categories signal a "paradigm shift." By contrasting Dominant and NonDominant categories and by identifying the assumptions underlying these categories the characteristics of this paradigm shift can be sketched. Chapter 12 addresses this contention that a paradigm shift is occurring in the area of reading comprehension research.

While identifying and tracking the hypotheses that researchers are testing in the name of reading comprehension is interesting and important in its own right, it falls short of providing answers to teachers' questions about methods for improving reading comprehension instruction. For this reason, we have produced, through qualitative analysis, specific reviews of the literature pertaining to comprehension instruction in a number of important areas such as special education , critical reading, background knowledge, and comprehension assessment. Since it became increasingly clear that individual team members had already developed considerable knowledge about particular portions of the data base over the course of the project, decisions about which topics should be chosen for in-depth analysis and synthesis were based both on these interests and on our desire to cover a wide range of topics.

From this point we proceeded to read or reread each of the studies coded in categories related to our topics. After much in-process discussion about the conclusions we were forming, we produced a series of synthesis papers which have served as the basis for this volume. To see the scope and thesis of each of these syntheses we refer you to the chapters which follow.

CONCLUSION

In this chapter we have described the design of a project funded by the federal government to review the research on reading comprehension instruction for special learners. Here we have focused only on the first three components of the process: data location and collection, data coding, and data analysis. Yet to be described are the results of the quantitative and qualitative portions of the meta-analysis. While we realize that our efforts to date represent only a few of the possible perspectives from which this large data base could be synthesized, it is the purpose of the remaining chapters of this volume to present our current view of reading comprehension research and what we see as implications for improving instruction.

PART II: QUANTITATIVE META-ANALYSIS

FINDINGS

Chapter 3

THE BIG PICTURE:
A QUANTITATIVE META-ANALYSIS OF READING COMPREHENSION RESEARCH

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INTRODUCTION

Over the past several decades research concerning reading processes and reading instruction has increased dramatically. This is evidenced by the growing number of professional journals that are primarily devoted to the publication of reading research. This has made the production of integrative reviews a necessity, but with the increased pace of investigation the task of synthesizing the mass of findings from these studies has grown more difficult. However, it is not simply the quantity of research which presents problems for would-be synthesizers. They also face the important decisions of which studies to include, and how the findings of these studies should be evaluated, compared, and weighted.

The quantitative meta-analysis technique proposed by Glass, McGaw, & Smith (1981) is one approach to the problem of research synthesis. Since it is this type of meta-analysis which will be discussed in this chapter, a brief description of this technique is in order. In quantitative meta-analysis the summary statistics reported for each study become the unit of analysis and are transformed into a common metric allowing direct comparison between studies. Smith & Glass (1977) define this measure, the effect size, as the difference between the means of the experimental and control group, divided by the control group standard deviation. Because studies often make more than one comparison between an experimental and control group, it is also common for a single study to produce a number of effect size scores. How effect sizes should be further analyzed is a matter of debate. Glass (1977) has suggested that meta-analysis ought to fulfill primarily descriptive purposes even though it is possible to use gain effects as a basis for traditional inferential statistical tests. Since he views the major purpose of meta-analysis as providing general conclusions for an entire area of study, Glass typically has used the average effect sizes generated for broad categories of studies to describe the relative effects of various types of experimental interventions. This and many other facets of quantitative meta-analysis are currently under heated debate within the educational profession. (The entire October, 1984 issue of Educational Researcher was devoted to meta-analysis.)

It is not my intent in this paper to address all of the methodological uncertainties of quantitative meta-analysis. These issues have been discussed in Chapter 1. Instead my purpose is to report on the procedures and results of the portion of our research project which used this technique to synthesize the literature on reading comprehension. Accordingly, my first aim is to present a picture of reading comprehension research (from 1974 to 1984) as seen through the lens of quantitative meta-analysis. Since it will become clear in my discussion that I feel the technique has been more useful for focusing on some types of research questions than others, a second aim of this chapter is to point out where quantitative meta-analysis has been most helpful and most limiting.

True to Glass' vision of the purpose of meta-analysis, the findings I will report will produce a picture which is little more than a general outline of factors which influence reading comprehension. Only as our team has combined quantitative and qualitative meta-analysis techniques has the image become sharp enough for us to have confidence in our conclusions. We have also found that looking at the entire data base, including those studies which were not amenable to quantitative meta-analysis, has caused us to take a different perspective on the scene and to see new trends and relations which were not evident in the initial profile of reading comprehension presented by quantitative meta-analysis.

Contrary to much that we read before beginning the project, we did not experience meta-analysis as a linear process moving smoothly from problem formulation, to data collection, to data evaluation, to data analysis and interpretation, and finally to the presentation of results (Cooper, 1982). Instead, we found it necessary to revise early decisions in light of subsequent insights. And now, after more than a year of work on this project, we recognize ways in which the coding of our data base could be revised to reflect our current understandings about reading comprehension research. Having said this, it still seems useful to organize this discussion in terms of the stages mentioned above: (1) problem formulation, (2) data collection, (3) data coding and evaluation, and (4) data analysis and interpretation. The first three stages of this meta-analysis have been described in detail in Chapter 2, so I will discuss them only briefly here. For more details readers may want to review parts of that chapter. I will discuss in depth, however, the major decisions made by our research team, some of the major points at which the meta-analysis process became recursive, and the major findings which have emerged. As a note to my readers, in the remainder of the chapter I will use the term "meta-analysis" to refer to the quantitative meta-analysis technique decribed above (Glass, McGaw, & Smith, 1981), unless otherwise specified.

PROBLEM FORMULATION

The formulation of the problem for this meta-analysis grew directly out of the requirements of the federal contract which funded the research. According to the contract, the purpose of the first part of the project was to analyze and synthesize both basic and applied research relating to reading comprehension in order to make recommendations for improving the reading comprehension skills of handicapped students. Both quantitave meta-analysis and traditional qualitative research review techniques have been used by our team to address this problem.

One aspect of problem formulation involves defining the construct "reading comprehension". While many investigators clearly state that they are studying some aspect of comprehension, they often fail to define this term, and it is evident from the variety of tasks and approaches used that they are not entirely in agreement about what constitutes comprehension. Because Glass and his colleagues (Glass, McGaw, & Smith, 1981) believe that meta-analysis is especially appropriate for drawing generalizations from broadly defined domains, we adopted a rather lenient criterion for defining reading comprehension. In order to represent the variety within the field as much as possible, we made the operational decision to include in our data base any reading research study with some focus on the meaning of text, or which used a dependent measure which met this condition.

DATA COLLECTION

One of the most crucial aspects of any integrative review involves the location and collection of research relevant to the problem under study. It is at this point that bias can either intentionally or unintentionally be most easily introduced into the review (Glass, 1977). Considerable attention has also been given to the possibility that published studies may have a positive bias because of the tendencies of editors and reviewers to accept articles reporting statistically significant findings (Glass, McGaw, & Smith, 1981). Thus, Glass and his colleagues stress the importance of making a concerted effort to find all research on the topic by searching the indexes of both published and unpublished studies. Only with such a concerted effort can valid generalizations be made about the area.

We were in strong agreement with these recommendations, and set as our goal the location of all reading comprehension studies, published or unpublished, during the 10 year period from 1974 to 1984. While we recognized this task to be enormous in its scope, we definitely underestimated its complexity. In fact, this was true to such an extent that it necessitated the hiring of a additional (and unbudgeted) staff member to coordinate the literature search.

Initially we began with a computerized search of CARS, a master library indexing system which includes Books in Print, Dissertation Abstracts, Psychological Abstracts , and other indexing systems. We initially identified 37,000 articles as potential candidates for this review, but finally limited the field to 5,000 which were accessed using "reading comprehension" as a descriptor. Because a hand search of important reading research journals indicated that the CARS/ERIC system was only locating 37.5% of the articles we had identified independently, we decided to continue to preview selected journals. We also sent letters to the members of the National Reading Conference and the National Conference on Research in English requesting copies of in-process, or unpublished research, or any work they thought we might have trouble locating.

Our other approach to the problem of locating all reading comprehension research between 1974 and 1984 was to cross-reference the bibliography of every article identified for inclusion in the meta-analysis. We then submitted any previously unidentified citations to the cycle of determination of relevance, location, and categorization.

After closer examination of the articles themselves, 573 studies were classified as reading comprehension research. Of the 573 reading comprehension studies, only 137 reported sufficient statistical information (means and standard deviations of experimental and control groups) to be included in the meta-analysis. While we are sure that some studies, both published and unpublished have somehow escaped our attention, we have nevertheless exhausted all the possibilities of which we are currently aware to locate research on reading comprehension produced during the last 10 years.

DATA CODING AND EVALUATION

Coding Decisions

In line with the recommendations of Glass and his colleagues (1981) we made the decision to include all studies which provided sufficient data and met our operational definition of reading comprehension. We chose not to eliminate studies because of flawed research designs . According to Glass, this prevents bias which might result from the imposition of arbitrary, nonempirical criteria for research quality. From his perspective, the evaluation of the effects of study quality should not be an a priori determination, but should instead be made empirically by examining the relation of methodological variables to the meta-analysis results. This allows the researcher to determine whether different patterns of results were produced by good and poor quality studies. If no such difference exists, Glass suggests that there is no reason to delete the important descriptive information included in these studies.

In the introduction I presented a brief description of the statistical technique of meta-analysis including the use of effect sizes as the dependent variable. In the context of the present discussion it is important to understand that studies are also coded on a variety of substantive and methodological characteristics which become the independent variables of the meta-analysis (Glass, McGaw, & Smith, 1981). Substantive features are directly related to the problem under study. Those coded in our study were: (1) sex, (2) race, (3) income, (4) achievement level in reading, (5) grade level, (6) handicapping condition, (7) class placement, (8) text factors, (9) reader characteristics, (10) task characteristics, (11) processing strategies, (12) dominant focus of the study, (13) linguistic unit, and (14) materials. Methodological features, on the other hand, are the general characteristics of the research designs employed in the studies, such as: (1) date of the study, (2) number of treatment/control comparisons, (3) number of dependent measures, (4) sample size, (5) duration, (6) external validity, (7) treatment personnel, (8) internal validity, (9) type of control group data, (10) internal consistency of treatments and dependent measures, (11) kind of dependent measure (e.g. comprehension questions), (12) type of dependent measure (e.g. standardized), (13) linguistic unit of dependent measure, and (14) instructional focus. These latter characteristics are the same ones used to evaluate the reliability and validity of any research design.

In order to specify which features should be coded for each study, we developed a taxonomy which included the 28 variables listed above. The form of the taxonomy which appears in Appendix A is the latest in a long line of drafts and revisions which became necessary over the course of the study as we attempted to code new studies. Each time we refined the taxonomy, previously coded studies needed to be reexamined to reflect these changes. In a research review of this size, recoding has been a tremendous task requiring rereading, recoding, and then reentering the information in the computer data base.

As we have continued to synthesize the literature using qualitative techniques, we have made additional changes in the taxonomy so that the current form now reflects an even broader view of reading comprehension research. We have not, however, had the resources or time to completely revise the coding of the 137 studies included in the quantitative meta-analysis to reflect these changes. For this reason we feel that some of the initial results of the quantitative meta-analysis are flawed. In the data analysis section , I will discuss the areas where we now feel the taxonomy categories used during the quantitative meta-analysis were weak, and examine the effect of this state of affairs on the results.

Validity and Reliability of Methodological Decisions

While the taxonomy provides categories which can be used to evaluate studies in the meta-analysis methodologically, the research procedures used by our team are themselves subject to validity and reliability checks. Glass, McGaw, & Smith (1981) list as validity considerations the clarity of definitions, the adequacy of information reported in located studies, and the degree of inference required to determine the characteristics of the studies from the written research reports . With regard to the clarity of definitions for variables used in our taxonomy, I have already alluded to the changing nature of some aspects of the taxonomy. However, the fact that these changes were necessary indicated both that the originial defintions were inadequate to describe the data, and that our meta-analysis procedure was flexible enough to allow movement toward definitions which fit the data more closely. Because of the emergent nature of the taxonomy, we feel that we have reached at least one valid representation of the reading comprehension research conducted from 1974 to 1984.

The second and third considerations pose more serious threats to the validity of the results of our meta-analysis. As mentioned earlier, only 23% of the reading comprehension studies in our data base reported enough data to be for included in the meta-analysis (i.e., means and standard deviations of the control and experimental groups). This has caused us to seriously consider the possibility that the studies included were somehow different in nature from those which were not. After examination of the studies with insufficient data, we have concluded that this hypothesis is at least partially correct. We have found that some of our taxonomy categories were underrepresented in the meta-analysis, and also that some new categories were necessary to accommodate the studies with insufficient data. Overall reading comprehension studies which were not amenable to meta-analysis included: (1) studies which used inferential or correlational statistics and reported only F and t ratios or correlation coefficients, (2) descriptive or ethnographic studies in which treatments were not compared, and (3) comparative studies which contrasted characteristics of subjects (e.g. good/poor readers, older/younger students) rather than treatments. Here we should note that formulae which estimate effect sizes from a variety of inferential and correlational statistics are available (Glass, McGaw, & Smith, 1981); however we have chosen not to use these techniques since they are yet to be proven and remain controversial. Thus, we feel it is important to present the results of this meta-analysis with the caution that it is likely that they do not fully represent the entire data base of 573 studies. This has been one of our main considerations in supplementing the findings presented below with extensive use of qualitative reviews to provide a more comprehensive view of the field

The third validity consideration, the extent to which coders must infer study characteristics from the written reports is also a threat to this meta-analysis. We found it difficult to make the kinds of distinctions demanded by our taxonomy, given the brief descriptions provided in most reports. This seemed to be heavily influenced by the editorial policies of the publishing journals, as we uniformly found some source publications to provide more adequate information than others. Interestingly, we found unpublished dissertations and technical reports to be some of the most complete sources of information about experimental treatments because of their extended discussions of research projects. In short, we were forced in many cases to infer characteristics of the studies included in the meta-analysis, and thus we may have incorrectly represented them in some ways.

However, it must be said in the context of this discussion that our meta-analysis suffers no more or less from these last two validity considerations than does any traditional review of the literature. These are difficulties which have been noted by most researchers attempting thorough integrative reviews, whether they have used narrative techniques or meta-analysis.

We also feel that the development of the detailed taxonomy is a special strength of this study and adds to the validity of our findings. The use of a taxomony which requires systematic evaluation of both methodological and substantive features ensures that each study has been thoroughly examined, and that the meta-analysis team has made a strong effort to understand the purposes, procedures, and results of all studies regardless of theoretical or methodological harmony with our own beliefs.

We have also evaluated the reliability of our meta-analysis by checking the inter-rater reliability of our coders at various points in the process. We found that inter-rater reliability coefficients was .92 by the end of the study. This simply means that the team members reached a high degree of social consensus about the manner in which information given in research reports should be coded. We continued to support the reliability of this process by having at least two team members read and code each study, with provisions for appeal to the entire group to resolve important disagreements if necessary. Given the complicated nature of the judgments which were required in order to code each study, we maintained a high degree of consistency. This agreement was developed by hours of group discussion during the initial development of the taxonomy and was refined through use. While our experience of trying to train new team members in the coding procedures have made it clear that newcomers cannot immediately make the same decisions as experienced coders, we do suggest that the meta-analysis coding reflects a consistent view of the data, albeit a socially constructed one.

Summary

To summarize, we feel after examining the methodology used in this meta-analysis that the results reflect reliable methods, but that the validity of the findings is limited by the characteristics of the research reports which formed the raw data for this study. This includes the lack of detailed description within studies, and the fact that the almost 75% of the located studies did not contain the statistical information necessary for quantitative meta-analysis. Still, any integrative review which describes well over 100 studies on 28 different variables is worthy of attention by those interested in research in the area of reading comprehension.

DATA ANALYSIS AND INTERPRETATION

The findings of this meta-analysis fall into two major categories. The first group of findings are related to methodological questions, and the second to substantive ones. Generalizations about the substantive issues related to reading comprehension can be further subdivided into statements related to characteristics of students and instruction. In each case the meta-analysis yields descriptive data of two sorts. First, it provides information on the frequency with which any particular level of a variable occurred in this data set, and second it provides a measure of the average effect size associated with that variable. After a presentation of some summary statistics on the the entire data set, I will deal with methodological and substantive findings in turn.

Overall Results

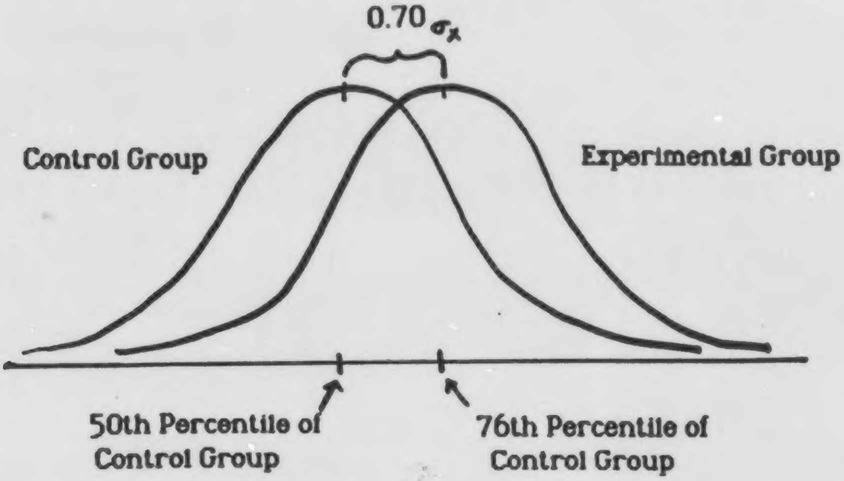
In earlier sections of this paper, I mentioned that the data for this meta-analysis contained effect sizes calculated from a total of 137 reading comprehension research reports. I also briefly explained that in meta-analysis more than one effect size may be derived from each study if several treatment and control group comparisons are made, or if the study uses a factorial design to address several research questions. At least one effect size is generated for each comparison or question. The total number of effect sizes in our study was 1537, and the contribution of single studies ranged from 1 to 60 effect sizes, with an average of 11.2 per study. While we are aware that multiple effect sizes generated from a single study are nonindependent, we chose to follow Glass' procedures which suggest that meta-analysis is robust to such problems (Glass, 1977).

The entire data set can also be described in terms of the grand mean of the effect sizes scores. We found that the mean effect size (Mes) of experimental groups compared to control groups was .70 (standard deviation= 1.73). This indicates that on the average students receiving an experimental treatment gained .7 of a standard deviation (SDes) more than controls who did not receive these treatments. To illustrate the approximate interpretation of this overall mean effect size, Figure 1 presents the distribution of scores for the control and experimental groups as two normal distributions. Assuming normality, the effect of experimental treatment was to make these students perform better than 76% of the control students on reading comprehension measures. Thus, it appears that on the average, the experimental treatments used in these studies were quite effective in improving reading comprehension.

We have chosen to present only descriptive data here and in the remainder of this discussion for the following reasons. First, if Glass (1977) is correct, it is likely that even small differences between mean effect sizes would be statistically significant given the large number of subjects involved in each comparison. Significance tests would yield little information concerning the practical importance of such differences. Secondly, as Landman and Dawes (1982) point out, the sampling distributions for inferential statistics in meta-analysis are yet to be evaluated, making the use of the usual inferential tests speculative at best. One informal criterion adopted by Landman & Dawes (following Smith, 1980) is to consider effect sizes reliably different only if they are more than two standard errors apart (SE of Mes= SDes ÷ the square root of N). In order to permit readers to make these informal evaluations, the number of effect sizes, the percentage of the total effect sizes, the average effect size, and the standard deviation of the effect sizes, are reported in the tables which accompany this paper.

Figure 1

AVERAGE EFFECT OF EXPERIMENTAL TREATMENTS



Number of Studies = 137
Number of Effect Size (ES) Scores = 1537
Average Number ES per Study = 11.2

Average Effect Size = .70 (SD=1.73)

Methodological Findings

Research Design

At the outset one of the most important questions to be answered empirically is whether the quality of studies included in the meta-analysis affected the average gain effect scores. As you can see in Table 1, effect size scores from studies with low internal validity were almost twice as large as those coded as high in internal validity. Thus, there does seem to be evidence that study quality effects the average gain effect scores. However, it is also important to note that the grand mean of the effect size is much more similar to the high internal validity subcategory, than to the mean effect size for the low internal validity category. So the effect of including the smaller group of flawed studies (22.6%) seems largely offset by the greater numbers of good studies (77.4%).

One problem which arose frequently in our meta-analysis was the lack of true control groups. Meta-analysis is based on the notion that standardizing each experimental group's score according to the control group's standard deviation will create a common metric. However, when control groups vary widely, experimental groups are necessarily being standardized differently. In our study researchers included a clearly identified control group only about half of the time. This situation often required us to choose one of the treatments to serve as the control computation of an effect size. While we find this a serious problem for data interpretation, the mean effect sizes for experimenter-assigned and coder-assigned control groups were .64 and .74 respectively. Using the informal criterion of two standard errors, these means do not differ reliably from one another as listed in Table 1. It seems that whether the original investigators or our team members designated a treatment as the control group the mean gain effect was about the same. This is an expected outcome of our coding procedure since we made control group designations by carefully reading the research reports to determine which treatments had been included to test important hypotheses and which were included mainly for comparison purposes.

Another variable which was of considerable interest to us was the relative percentages of "basic" and "instructional" research studies in the data base. We should note that this distinction seemed clear at the outset of the project, but became increasingly fuzzy as we tried to code real studies. However, our operational decision was to designate a study as "instructional" if researchers were testing the effects of an instructional technique which they would suggest for adoption in classrooms without modifications. The percentages of direct instruction (44%) and non-instructional effect size scores (44%) was for all practical purposes the same, with relatively minor differences in the mean effect size for these two categories. If our data base is at all representative of the whole of reading comprehension research during the last ten years, it seems that there has been a rather balanced effort to investigate the cognitive processes involved in reading and the

Table 1

Methodological Findings

The average reading comprehension study in our data base:	Variable	N[1]	%	M_{es}[2]	SD_{es}[3]
1. HAS HIGH INTERNAL VALIDITY	High I.V.	1190	77%	.58	1.2
*Studies with low Internal Validity have higher M_{es}.	Low I.V.	347	23%	1.11	2.86
2. MAY OR MAY NOT HAVE A TRUE CONTROL GROUP	Control Gr.	770	51%	.64	1.42
*M_{es} is similar for studies with and without true control groups.	Assigned CG	757	49%	.74	1.98
3. INVESTIGATES BASIC PROCESSES OR DIRECT INSTRUCTION	Dir. Inst.	669	44%	.74	2.12
*M_{es} is similar for basic and applied research.	Basic Res.	679	44%	.62	1.37
4. LASTS 1 WEEK OR LESS *Studies with short duration have higher M_{es}.	1week	980	64%	.83	2.0
5. HAS A TREATMENT CONDUCTED BY THE RESEARCHER	Researcher	1297	84%	.74	1.79
*M_{es} is similar whether the teacher or researcher administers the treatment.	Teacher	140	9%	.66	1.42
6. HAS A SAMPLE SIZE OF MORE THAN 50	0 - 50	655	43%		
	50 or more	882	57%		

[1] N= number of effect size scores.

[2] M_{es}= mean effect size score.

[3] SD_{es}= standard deviation of effect size scores.

instructional techniques which are most effective in facilitating comprehension.

Duration of the study is another methodological feature which influences the average effect size obtained. Over half (63.8%) the gain effects were produced by studies lasting one week or less, with another 30% lasting from two to nine weeks. As indicated in Table 1, the studies with the shortest duration, 1 week or less, had an average effect size of .83, while the two to nine week studies had an average effect size of .50. We might hypothesize that shorter studies benefitted more from the Hawthorne Effect than did longer studies in which students had time to adjust to the novelty of participation in an experiment. It is also possible that longer studies may have presented more complex treatments leading to a more global match between the treatment and outcome measure, which as discussed below, also affects average effect sizes.

An encouraging trend related to duration is apparent when numbers of effect sizes from studies lasting more than one week are plotted against the date of the study. Figure 2 graphically illustrates this jagged but increasing trend in the percentage of gain effects derived from studies lasting more than one week. This is especially interesting since most descriptive and ethnographic studies, which are typically of longer duration, are not included in the meta-analysis. It is likely that this trend reflects researchers' increasing awareness of the complexity of the classroom environment and the importance of ecological validity for studies designed to make recommendations about instructional practice.

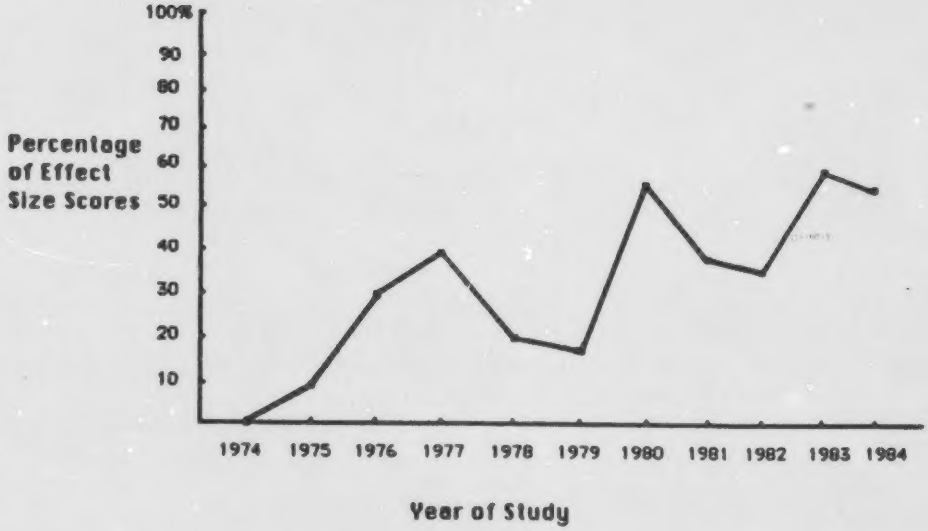
While more studies are beginning to cover longer periods of time, we found that the researcher still administers the experimental treatment in 84.4% of the cases. The regular classroom teacher delivered the experimental treatment only 9.1% of the time. Our results, shown in Table 1, indicate only small differences in the average gain effects of these two subgroups. This finding could be interpreted in two ways. First, we might suggest that the researcher has the same effect on the results of the treatment as does the students' regular teacher, but conversely we might also stress that the teacher's direct participation had no adverse effects on the outcome of the experimental interventions. This may indicate that researchers should be considering more collaborative research in which regular classroom teachers become a part of the research team.

Another promising finding is that 57.4% of effect sizes were based on sample sizes of more than 50 students, and only 15.6% were based on studies with 25 or fewer students. Larger sample sizes should theoretically add to the stability of reading comprehension results, decrease the likelihood of drawing extremely biased samples, and increase the chances of finding significant differences if they exist.

Summary profile. To summarize our findings thus far, we are building a profile of an average reading comprehension study which has high internal validity, lasts less than one week, uses a sample of more than 50 students,

Figure 2

Yearly Percentage of Effect Size Scores from Studies Lasting More than One Week



has an experimental treatment administered by the investigator, and which may or may not contain a true control group. This average study is equally as likely to investigate the cognitive processes used in reading as reading instruction. Moreover, studies of short duration and low internal validity have been shown to yield higher average effect sizes.

Dependent Measures

A final group of methodological variables provides information on the effects of dependent measures. First, we find that most effect size scores come from studies using more than one dependent measure. In fact, only 6.5% came from studies using a single outcome measure. Second, Table 2 indicates that 50% of the time the dependent measure was some form of reading comprehension questions. Together, retellings and vocabulary tests accounted for another 30% of the outcome measures. When the average effect sizes are examined for each of these categories, vocabulary tests result in more than twice the mean gain effect obtained by using reading comprehension questions (1.77 and .70 respectively). Retellings result in slightly lower (.50) mean effect sizes. A simple interpretation of these results indicates that the more specific and structured the outcome measure, the higher the effect size . It seems to be the case that certain types of outcome measures are usually linked closely with the type of instruction provided. For example, this seems to be especially true for vocabulary instruction where the outcome measures were almost always vocabulary tests.

The findings just reported are also consistent with our observations of a generally decreasing trend for mean effect sizes as the linguistic unit used in the dependent measure increases. Evidence of this is shown in Table 2. The mean effect size obtained for measures using words as the largest unit of text (Mes=1.28) was twice as large as when whole texts were used (Mes=.62). Dependent measures using whole texts were the most frequent, followed by those using multiple unrelated paragraphs and single paragraphs. A similar pattern for the texts used in experimental treatments will be discussed in the section of this chapter on substantive findings.

Two other features of the dependent measures which produced differential effects on our meta-analysis results are the type of measure (standardized or non-standardized) and the degree of internal consistency between the treatment and the outcome measure. We found that only 5% of the gain effects involved the use of standardized tests and that this small subcategory had less than half the mean effect size produced by non-standardized measures (.30 and .72 respectively). This is particularly ironic since Glass (1976) specifically points to the standardization of outcome measures as one characteristic of reading comprehension research which makes it especially suited to meta-analysis. While informal observation suggests that standardized tests are widely used in school settings, this is not the case for most of the reading comprehension research included in this data base.

Table 2

Methodological Findings: Dependent Measures

The average reading comprehension study in our data base:	Variable	N[1]	%	M_{es}[2]	SD_{es}[3]
1. USES MORE THAN 1 DEPENDENT MEASURE	1 dep. ms.	100	7%		
	More than 1	1407	92%		
2. USES COMPREHENSION QUESTIONS AS THE DEPENDENT MEASURE	Vocab. Tests	103	7%	1.77	4.5
	Comp. Q's	772	50%	.70	1.3
	Retellings	336	24%	.50	1.2
*More structured dependent measures produce higher M_{es}.					
3. USES NON-STANDARDIZED MEASURES	Non-Stand.	1460	95%	.72	1.76
	Stand.	77	5%	.30	.83
*Non-standardized measures produce higher M_{es}.					
4. USES DEPENDENT MEASURES WHICH CONTAIN WHOLE TEXTS.	Sentence	59	4%	1.51	3.45
	Paragraph	193	13%	1.04	2.02
	Multiple ¶s	482	31%	.45	.88
	Texts	685	45%	.63	1.25
*Dependent measures which focus on smaller linguistic units have higher M_{es}.					
5. HAS HIGH INTERNAL CONSISTENCY BETWEEN THE EXPERIMENTAL TREATMENT AND THE DEPENDENT MEASURES.	High I.C.	859	56%	.83	1.89
	Medium I.C.	624	41%	.50	1.45
*High internal consistency produces higher M_{es}.					

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[1] N = number of effect size scores.

[2] M_{es} = mean effect size score.

[3] SD_{es} = standard deviation of effect size scores.

As we see in Table 2, the degree of internal consistency between experimental treatments and outcome measures is almost equally divided between those coded in the high and moderate internal consistency categories. An example of high internal consistency would be a treatment which teaches vocabulary and then uses a vocabulary test as the dependent measure. However, if the investigator had chosen to measure the outcome with reading comprehension questions the internal consistency would have been coded as moderate. When this variable is examined, high internal consistency appears to produce higher average effect sizes (.83) than does a more moderate match (.49). This finding is not surprising. Many other studies have demonstrated that students are quite attentive to the specific demands of classroom instruction, and master the skills needed to complete these activities successfully. What seems more important in the realm of reading comprehension is whether instruction improves students ability to transfer these skills and abilities to new encounters with text.

Summary profile. These findings concerning dependent measures may be summarized by adding some other dimensions to our profile of the average reading comprehension study. A study most typical of our data, uses a non-standardized test consisting of reading comprehension questions as one of several outcome measures. These measures are also likely to contain whole texts and to be closely or moderately matched to experimental tasks. When the dependent measures are nonstandardized, or highly consistent with instruction, or when measures use small units of text such as words, average gain effect scores are higher.

Substantive Findings

The findings presented thus far have focused on the research designs used in reading comprehension studies. I have already presented considerable data to support the assertion that design features can differentially effect the size of gains made by students participating in experimental treatments. Meta-analysis seems particularly good in helping to make this type of generalization. But because the studies coded into each substantive category of our taxonomy are methodolically diverse, our team has approached the task of making instructional recommendations from this data with the greatest caution. As we have continued to read, reread, code, and synthesize studies using qualitative meta-analysis techniques, we have become increasingly suspicious of the notion that a single descriptive statistic (the average effect size) can describe any category of reading comprehension research effectively enough to allow us to make instructional decisions. Yet, this is just what the strongest proponents of meta-analysis would suggest. For example, Glass (1977) provides the hypothetical example of a senator conducting NIMH hearings on psychotherapy who uses meta-analysis findings to make funding decisions. We do not believe that the simplest answers are always the soundest guides for educational practice. For this reason I present these substantive findings with cautions against overinterpretation of their significance. Only through careful examination of the studies in each category can the importance of the average effect sizes be interpreted.

The findings which are presented below address issues related directly to the purpose of this research project, that is, to make recommendations for improving the reading comprehension skills of handicapped students. The first group of substantive variables includes subject characteristics such as reading achievement level, grade level, handicapping condition, class placement, sex, race, and income. Like the methodological variables, these subject variables summarize across all types of experimental treatments providing us with general information about the responses of different groups of students. A second group of variables deals with specific characteristics of experimental treatments. Here average effect sizes reflect the variation between the different types of subjects, the different methodologies employed, as well as the differing purposes and procedures of experimental treatments coded in a particular category. I will first discuss subject variables and then treatment variables.

Subject Characteristics

Because this research project was funded to make recommendations for improving instruction with a particular population--"handicapped students"--subject variables take on special importance. One of the most striking findings of our study is the extremely small number of studies (n=37) in this data base which study the effect of reading comprehension instruction on special education students. Only 113 (7.4%) of the effect size scores came from studies with "special" students, and this number includes students described as mentally retarded, learning disabled, emotionally disturbed, and hearing impaired. See Table 3 for this data. When an average effect size is computed across all these handicapped categories the mean effect size is 1.20. This is considerably higher than that of the non-labeled students (Mes= .66). While reliable interpretation of this effect size is difficult given the small number of studies and the great variety of students and types of treatments from which it is derived, it does at least indicate that experimental interventions can have quite positive effects on the reading comprehension of handicapped students. However,the strongest implication of these data is a practical one. At present, any recommendations concerning comprehension instruction for special students must be based on research with non-labeled populations. Because of the small number of effect size scores in each category, it is also impossible to make any statements concerning the differences between placement of special students in self-contained or mainstreamed classrooms.

Other findings indicate that, overall, about 50% of effect sizes came from subjects classified as good readers. The data for this finding is shown in Table 3. It is interesting that the average effect size computed from the 288 scores produced by studies with poor readers (Mes= .80) is slightly higher than that of the good readers (Mes= .74). Once again this is a tentative indication that researchers are using instructional treatments which are effective in improving the comprehension of less able students. However, more specific conclusions require careful examination of the characteristics of these treatments. It is possible that methodological factors such as high internal consistency and choice of structured outcome measures may be

Table 3

Substantive Findings:
Subject Characteristics

The average reading comprehension study in our data base:	Variable	N[1]	%	M_{es}[2]	SD_{es}[3]
Characteristics of Subjects:					
1. STUDIES NON-HANDICAPPED STUDENTS	Non-Hand.	1424	93%	.66	
	All Hand.	113	7%	1.20	
*Handicapped students benefit more than non-handicapped students.					
2. STUDIES GOOD READERS	Good Readers	755	49%	.74	1.30
	Poor Readers	288	19%	.80	2.83
	Mixed Groups	482	31%	.58	1.46
*Good and poor readers make similar gains.					
3. STUDIES STUDENTS IN GRADES 4 - 6	Grades 1-3	179	12%	.58	1.07
	Grades 4-6	775	50%	.85	2.17
	Grades 7-9	103	7%	.53	.68
	Grades 10-12	142	9%	.62	1.45
	Grade 13+	228	15%	.56	.55
*Intermediate grade students have the highest M_{es}					

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[1] N = number of effect size scores.

[2] M_{es} = mean effect size score.

[3] SD_{es} = standard deviation of effect size scores.

influencing both this result and that for the special education students reported above.

A final subject variable to be discussed here is grade level. As shown in Table 3, our meta-analysis data indicate that 50% of the effect size scores involved students in grades four through six, with another 12% from studies of primary students (grades one through three). A total of 15.9% of the scores came from junior high and high school students, and a slightly smaller number (14.8%) came from college students. Inspection of the average effect sizes in these categories shows the largest gain in grades four through six.

There are several variables about which we cannot make any statements. Two examples are the sex and race variables. Most studies used samples of mixed sex and racial composition or else reported no information on these variables. Similarly, few studies provided information on the income level of students and thus no generalizations can be made.

Summary profile. Once again it is possible to summarize these findings by enlarging the profile of subjects in the average comprehension study. Our data indicate that typical studies draw their samples from the population of non-labeled, intermediate grade students who are good readers. There is also some evidence that studies focusing on intermediate students or special education students have higher effect sizes than other studies.

Treatment Characteristics

The taxonomy we developed allowed us to code each experimental and control treatment simultaneously on seven variables. Two of these variables involve the types of materials used in the treatment, and four others reflect the researchers' attempts to experimentally manipulate reader, text, task, and processing strategy characteristics. The last variable, dominant focus of the treatment, was selected from among the reader, text, task, and processing strategy codes already assigned.

Our findings indicate that overall, researchers tended to use materials that they had designed or specially altered for the purposes of the study (67%). Data presented in Table 4 also indicate that the second most frequently used materials were selections from commercially published reading series (31%), with only a small fraction (3%) of the studies making use of trade books, newspapers, or other texts not designed specifically for instruction. Examination of the differences in mean effects sizes for researcher-made (Mes=.80) and commericially published (Mes=.49) materials indicates that researchers may have made some positive changes in instructional texts, or alternately that these texts were more tailored to the instructional tasks than were the commercially available materials.

While these results provide an overall picture of the materials used, examination of the interaction of this variable with the type of study ("basic

Table 4

Substantive Findings
Treatment Characteristics: Materials

The average reading comprehension study in our data base:	Variable	N[1]	%	M_{es}[2]	SD_{es}[3]
1. USES RESEARCHER-DESIGNED MATERIALS	Res.-made	1027	67%	.80	1.95
	Published	468	31%	.49	1.17
	Trade	42	3%	.62	.69
*Materials designed specifically for use in a particular treatment produce higher M_{es}. *In basic processes studies 89% of the materials were researcher-designed. *In instructional studies 40% of the materials were researcher-designed and 60% were published.					
2. USES WHOLE TEXTS IN THE EXPERIMENTAL TREATMENTS	Sentences	83	5%	1.93	4.98
	Paragraphs	186	12%	.99	2.02
	Multiple ¶s	493	32%	.54	1.04
	Texts	714	47%	.63	
-Treatments focusing on smaller linguistic units produces larger M_{es}.					

[1] N= number of effect size scores.

[2] M_{es} = mean effect size score.

[3] SD_{es} = standard deviation of effect size scores.

process" or "instructional") provides an interesting pattern of results. We found that in basic process studies 89% of the materials used were researcher designed, but in instructional studies only 40% fell into this category. For the latter group 60% of the materials were drawn from commercially published reading instruction series. This seems to indicate that researchers interested in making statements about instructional interventions are concerned with the ecological validity of the materials they incorporate in their studies. They use the materials that are most frequently found in American classrooms--basal reading series. On the other hand, researchers interested in the basic processes of reading overwhelmingly tend to create their own materials--usually to highlight some aspect of processing.

The second treatment variable related to experimental materials involves the size of the linguistic unit, such as sentences, paragraphs, or whole texts. As Table 4 shows, the pattern for treatment materials is similar to that seen in dependent measures. Studies using whole texts generated 47% of the effect size scores, and were followed by studies using shorter selections of several paragraphs (32%), several unrelated paragraphs (12%) and unrelated sentences (5%). As with the dependent measures, when sentences were the linguistic unit the mean effect size (Mes=1.93) was substantially higher than any of the other categories. In our study, treatments which focused on smaller linguistic units produced larger mean effect size scores. Once again, this finding may be the result of higher internal consistency between treatments and measures. It may also be that the "sentence" category is more easily influenced by a few extreme scores because of the smaller number of effect size scores coded in the category.

As I have stressed above, the interpretation of the meta-analysis results in relation to specific characteristics of instructional treatments is extremely problematic. Though meta-analysis can generate a mean effect size score of each of the text, reader, task, and processing strategy subcategories, with such a diverse array of treatments in each category it is difficult to understand what if any instructional implications are justified from these statistics. For example, we have been unwilling to conclude that instruction in inferencing is more beneficial than instruction in using macro-operators simply because the mean effect size score for inferencing is higher. There simply are too many other variables influencing these summary statistics. It is entirely possible that a single category could contain some studies yielding very high gains along with some yielding very low gains, only to produce a mean effect size which is very similar to the grand mean for all of the studies. For us a single mean is not sufficient evidence for making important instructional decisions. It does not do justice to the care with which researchers and teachers have designed and implemented reading comprehension instruction for very specific goals.

For these reasons, I have chosen not to report the mean effect size scores for each treatment subcategory. After reading the studies in each category, we feel little sense of the "fit" between the mean effect size scores produced and our own sense the overall conclusions which would otherwise be drawn for each category. Quantitative meta-analysis, as we have operationalized it, has not been particularly helpful in answering specific questions about reading comprehension instructional treatments.

With our position on this matter stated explicitly, I will present some of the general findings from the text, reader, task, and processing strategy categories. Since an average of 11.2 effect size scores was produced by each study, we first set a criterion level of 100 effect sizes for examination of a category. Our rationale was that, on the average, these categories should contain data from about 10 different studies, and should be large enough to be fairly resistant to the influence of outliers. Table 5 shows that we identified five categories with 100 or more effect size scores. When we examined the studies included in three of these categories, (illustrations, inferencing, and macro-operators) we concluded that they had been consistently and clearly defined. However, examination of the other two, schema availability and situational context, revealed that these categories had been defined too broadly and thus, we had used these categories as a kind of "dumping ground" for studies which didn't fit elsewhere. When we began the qualitative meta-analysis, we made final revisions to the taxonomy (see Chapter 2). Studies coded as focusing on "schema availability" were dispersed among five other codes, and situational context studies were distributed among three subcategories. Though most of the categories used during the quantitative meta-analysis were well-defined, the ambiguity in these two instances seriously limits our conclusions.

Because so few categories had 100 or more effect size scores, we chose 40 as an alternate cut-off point. Table 5 shows that this decision allowed us to add to our list of the most frequently researched hypotheses, three text categories (repetition of concepts, explicitness, and cohesion) and 2 processing strategy categories (schema construction, and transmediation) . Overall, this list provides a good indication of the strands of research which received the most attention in our sample of 137 studies.

Within the text category, there was considerable attention to the effect of presentation versus non-presentation of illustrations, and to the effects of different types of ilustrations. Several studies also investigated the effect of the relationship between the content of the text and illustrations. Studies investigating different types of advance organizers, adjunct questions, and titles were coded in the repetition of concepts category and were heavily researched. Textual explicitness and cohesion were the other text features receiving major attention.

As for reader characteristics, the schema availability category contained a combination of studies focusing on the effect of readers' existing background knowledge and on the effect of their ability to access and use particular reading strategies. In the processing strategy category, the most widely researched topics involved use of inferential reasoning, use of macro-operator rules for summarizing and chunking texts, use of metacognitive strategies, and use of mental imagery and art to express meanings gained through reading. Many fewer studies had task features as

Table 5

Substantive Findings:
Treatment Characteristics

Code	Category	Subcategory	N
1. THE FOLLOWING SUBCATEGORIES HAVE 100 OR MORE ES CODED AS DOMINANT FOCUS:			
109	Text	Illustrations	109
202	Reader	Schema Availability	231
309	Task	Situational Context	140
406	Processing Strat.	Inferencing	163
411	Processing Strat.	Macro-operators	118

-Subcategories 202 and 309 have been divided since the completion of of the meta-analysis. Subcategory 202 has been divided into 5 new codes, and Subcategory 309 has been divided into 3 new codes.

Code	Category	Subcategory	N
2. THESE SUBCATEGORIES ARE ADDED WHEN THE CUTOFF IS SET AT 40 OR MORE ES CODED AS DOMINANT FOCUS:			
103	Text	Repetition of Concepts	55
104	Text	Explicitness	44
109	Text	Cohesion	58
407	Processing Strat.	Schema Construction	58
413	Processing Strat.	Transmediation	42

3. M_{es} FOR THE FOUR MAJOR TREATMENT CATEGORIES ARE AS FOLLOWS:

TEXT	.77
READER	.60
TASK	.69
PROCESSING STRATEGIES	1.04

dominant focus, and when the situational context subcategory was examined it did not seem to represent any one kind of treatment manipulation. Thus, we are not able to single out one type of task manipulation as especially important.

A final set of results related to treatment characteristics involves the overall mean effect sizes for the text, reader, task, and processing strategy variables shown in Table 5. As you can see, studies with dominant focus on processing strategies produced a somewhat higher mean effect size (Mes=1.04) than did the text (Mes=.77), reader (Mes=.60), and task (Mes=.69) categories. However, each of these last three categories did produce substantial gains when compared to the nontreated controls, and each is quite close to the grand mean of the effect sizes (Grand Mes=.70). Thus, as a general rule, studies in our sample which focused on facilitating readers' use of particular processing strategies produced the highest gains, but studies focusing on text, reader, and task features were also beneficial in improving students' performance relative to the controls.

Summary profile. In summary, we found that quantitative meta-analysis was not particularly helpful in answering questions about the effectiveness of specific types of comprehension instruction. However, it did allow us to build a profile of the materials and dominant focus of the typical comprehension study in our data base. First, most basic processes studies used researcher-designed materials, while instructional studies usually used commercially published reading materials in the treatments. Second, researchers were most likely to use whole texts in their interventions, although choice of an excerpt of related paragraphs was also frequent. Treatments using materials with smaller chunks of text (such as sentences) produced higher gains in effect size scores. A third finding indicated that the typical study in our data base focused its experimental treatment on investigating the effect of: illustrations, adjunct aids, textual cohesion, textual explicitness, background knowledge, and availability of reading strategies,or on the use of inferential reasoning, macro-operator rules, metacognitive strategies, or alternate communication systems.

CONCLUSION

Implications for Researchers

From my perspective, the process of meta-anlysis has been tremendously valuable in helping us to approach the enormous task of synthesizing reading comprehension research for the past 10 years. If for no other reason, it has spurred us to develop a taxonomy which provides a consistent and organized means for evaluating reading comprehension research whether or not it is submitted to quantitative meta-analysis. We have found this way of thinking about research to be a powerful framework, both because it has provided us with the common vocabulary for discussing research, and because it has forced us to systematically and thoroughly attempt to understand the studies we have read.

The results which I have presented above represent only one slice of our data. However, they do provide some general descriptive information both about the methodological and substantive characteristics of reading comprehension research produced during the last decade. One clear finding related to the overall purposes of this study is that very little attention has been focused on comprehension instruction for special education students. Quantitative meta-analysis seems especially strong in producing the systematic demographic information about research methodology and hypotheses which allows us to make such statements. This has been tremendously important in helping us sketch the big picture of this field.

However, from our experience, what meta-analysis does not do well is to answer questions about the relative effectiveness of instructional treatments--and this is exactly the situation for which Glass has tauted it as most useful. Perhaps the most important reason for this is the complex nature of the hypotheses currently being tested in reading research. Studies making simple comparisons between control and experimental instructional treatments are rare. Instead, researchers simultaneously investigate the effects and interactions of a complex of factors which serve to situate the instruction in a particular context of situation with particular types of learners. As we have attempted to simultaneously code all of the hypotheses being tested in each study, we have constructed a picture of reading comprehenson which is rich in inter-relationships between text, task, reader, and processing strategy factors, and a picture of reading comprehension research which is equally rich in the multi-directional influences of methodological features.

To use Spiro & Myers' (1984) metaphor, we now see reading comprehension and reading comprehension research as an "entangled domain" where "there is at best a partial and irregular overlap of thematic features . . . and of the ways relevant features relate to each other on each occaision" (p. 493). The activity of attempting to categorize studies with a neatly organized taxonomy has forced us to recognize the tangle of relationships which were difficult to capture in its use. Thus ironically, the activity of conducting a quantitative meta-analysis has been tremendously valuable in helping us to understand the field. But we are dissapointed in the product which has resulted--a set of mean effect size scores.

Now more than ever, we are unwilling to use single mean effect size scores to judge the relative effectiveness of one type of instruction as opposed to another. Moreover, we have come to understand that research in our field has moved past these univariate questions. Reading, and learning in general, is much too complex to be described in simple absolutes. The only answers which researchers can honestly give to such questions are necessarily qualified with caveats concerning effects of text, task, reader, and processing strategy variables.

Our dilemma in conducting a quantitative meta-analysis is analogous to the selection of 40 or 50 individual dots from a photograph for the purpose of making judgments about its content. Even when the data points are chosen in such a way as to represent an entire area of the photo, it is clear that much has been lost. When a single point is examined, the inter-relationships, the variation, the gestalt of the photograph are gone. To begin to understand the photo it is necessary to see where and how the points are distributed, and to infer what underlying forms may be represented by their relative positions on the paper. Chapters 2 and 12 describe how the use of the taxonomy has helped us to see the major types of hypotheses being tested, and their inter-relationships in relation to researchers' underlying theories of reading. To attempt, then, to interpret the mean effect size score of a category apart from this web of relationships is to take an unrealistically simple view of the nature of the studies included and of the types of hypotheses researchers have tested. It would also require us to ignore the statistical impact of the methodolgical diversity of studies coded in each category .

But I am not arguing that reduction is always impossible or undesireable, just that our experience suggests that quantitative meta-analysis should be reserved for domains that are narrower, and perceived as better structured. Perhaps with careful selection of studies that have similar control groups and closely allied instructional goals, quantitative meta-analysis could be helpful in determining their relative effectiveness. Though this is not in the "Glassian" tradition, it may prove a more reasonable use of the technique. It has simply not been our experience that throwing everything into the same pot aids detection of differences.

But how, then, can we begin to answer substantive questions such as, "What types of instruction are the most effective in improving reading comprehenison?" I suggest that more complex answers must come from narrative reviews which consider carefully the specifics of experimental interventions. In order to produce a picture of reading comprehension which gives the fine grained details we desire, I believe it is necessary to view the findings of this meta-analysis from the broader perspective of the entire data base, and then to combine the general images produced by quantitative meta-analysis with the detailed information about instruction which a qualitative meta-analysis provides. Chapters 4 through 12 represent the attempts of our research team to achieve this integration, and to address specific questions about instruction.

PART III: QUALITATIVE META-ANALYSIS

FINDINGS

Chapter 4

A GUIDED TOUR OF THE LANDSCAPES: RESEARCH ON READING COMPREHENSION INSTRUCTION

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INTRODUCTION

The reading ability of American students is a topic which has come increasingly to the forefront of public attention with the release of a number of reports on our nation's schools. (See for example, A Nation at Risk, and Action for Excellence.) For educators this is not a new concern. Teachers at every grade level and in every content area are daily impressed with the importance of reading in the learning process. As concerned teachers we frequently find ourselves searching for ways to improve reading instruction in an effort to help students increase their comprehension of the texts they read in and out of school. We also find ourselves asking, "Where can we look for information which will help us improve the reading experiences which take place in our classrooms?" This chapter is written primarily to help teachers become aware of the resources available to them in their search for better methods of reading comprehension instruction, although researchers may also be interested in it as a means for reviewing the most frequently researched hypotheses in the area of reading comprehension instruction.

Traditionally, teachers have looked to a variety of sources when they need help with instruction--among them, published reading programs, colleagues, university personnel, reading methods textbooks, and professional journals. It is this last source, professional journals, which contains reports of current research on the effects of instructional techniques. While it is true that research journals report some of the most exciting and innovative instructional techniques, they are also perhaps the most difficult resource for classroom teachers to use.

One reason for this situation is the great number of such publications. A second factor is the difficulty of locating articles which relate specifically to comprehension instruction, and a third is the difficulty of gaining an overview of current comprehension research which would enable teachers to choose articles which speak most clearly to the problems they face in their own classrooms. However, teachers are not the only ones who have difficulty in gaining this broad perspective on the field.

Over the course of this research project, each member of our research team has read literally hundreds of comprehension studies. In order to code the characteristics of each study, we have meticulously identified the methodological and substantive characteristics and then recorded them on the coding sheet seen in Appendix A. One morning at our regular staff meeting about six months into the project, I pointed to the big gray file cabinet filled with copies of the 573 studies in our data base and asked, "Do we really know what's in those drawers?" This may have seemed like an odd question, since each of us could talk about a great many individual studies, but in asking it, I found that I expressed a feeling that had been growing among the research team. Without a consistently constructed overview of the data base, none of us were certain whether the particular group of studies we had read represented the field as a whole, or only some small corner of it. While we were becoming familiar with some of the instructional techniques investigated by researchers for improving reading comprehension, each of us wondered what we had not yet encountered. From this conversation grew the decision that I should consolidate the summary data we had available and construct the overview which is presented in this chapter.

Teachers also find themselves in need of this same information. As they look for new suggestions to improve reading comprehension instruction, they begin to wonder what techniques have already been investigated and with what results. Because we have found it so helpful to approach the field of reading comprehension research with an overall notion of its contours, this chapter is designed to take readers along on a guided tour of its most important landmarks as we have come to know them. By building a cognitive map of comprehension research produced in the last ten years teachers and researchers should be able to choose more productive paths and to avoid dead ends in their search for ways to improve reading comprehension. This chapter should be helpful for readers who wish to keep abreast of current trends in reading research, as well as for those who look to this research for practical suggestions for instruction.

In the next section, I will focus my discussion on three major trends which have emerged from a group of approximately 140 studies of reading comprehension instruction. These studies are a subset of our larger data base containing 573 reading comprehension studies published or prepared between 1974 and 1984. The remainder of the chapter will be devoted to an overview of the types of instructional strategies which have received the most study in the last 10 years. Hopefully, an understanding of the issues frequently addressed by researchers will help teachers to identify areas they may wish to pursue further as they seek to improve their classroom comprehension instruction. I will also provide suggestions of how they might use this volume to locate the information they need to inform their curricular decisions.

GENERAL TRENDS IN COMPREHENSION INSTRUCTION

First, during the past decade most comprehension research has come to rest on a theory of reading which acknowledges the active role of the reader.

This is a trend which has recently been noted by other reviewers of research as well (Kamil, 1984). Generally speaking, researchers assume that "comprehension is a constructive process in which meaning is derived from the text and from interactions between the text and the background knowledge of the reader" (Carr, Dewitz, & Patberg, 1983, p.1). This is in contrast to earlier theories which suggested that the act of reading involved a transfer of the meaning residing in the text to the reader, and assigned to readers the passive role of information receivers.

Schema theory (Anderson & Pearson, 1984), which acknowledges the active role of the reader, is one widely accepted description of the cognitive processes involved in reading. It is currently reflected in both the focus and theoretical underpinnings of much instructional research. Briefly, Pearson & Spiro (1982) suggest that people have concepts (or schemata) for objects such as chairs and trees, as well as for feelings like love, or actions like running or eating at a restaurant. Each of these schemata include a broad range of associations derived from personal experience. For example, a reader's schema for party may include particular types of food, activities, dress, people, or any other feature which has been related to parties in his or her experience. When the reader encounters the word "party" in a text, it is on the basis of this complex of past experiences that he or she will interpret the text and make predictions about upcoming segments of text. Therefore, a student reading with a party schema in mind is likely to interpret the sentence, A boy came to the door., as the arrival of a guest rather than the paperboy.

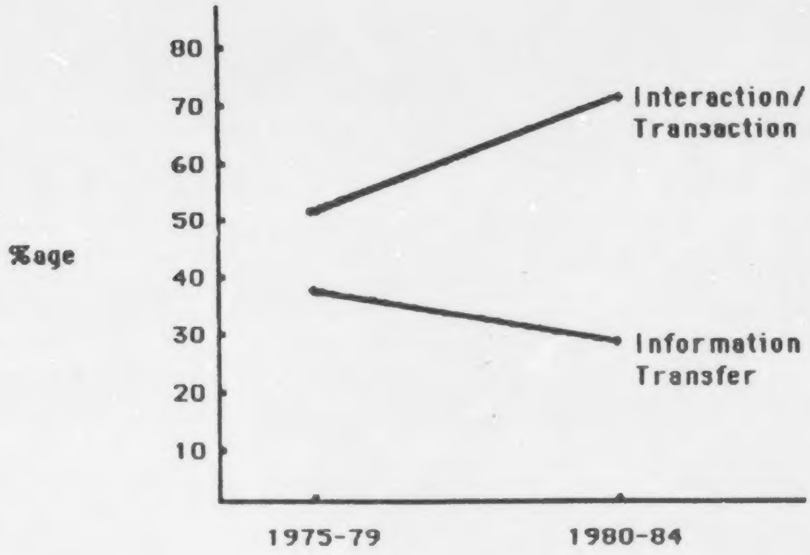
This theoretical orientation is currently reflected in the large amount of instructional research which focuses on factors internal to the reader. When readers are seen as active, it no longer enough to simply describe their overt reactions to texts and tasks; instead it is important to identify the types of cognitive processes involved in these responses. When researchers and teachers accept this active, constructive role for readers, it is natural that they should begin to focus efforts on designing instruction which helps readers make use of their existing background knowledge or helps them to build the background necessary for upcoming reading experiences.

Second, there is a trend toward comprehension instruction which focuses on higher levels of cognitive processing.

This is related to the already mentioned move away from information transfer theories of reading, and toward theories which suggest that the reader engages in a variety of higher-level thinking processes (e.g, inference, prediction) during comprehension. Figure 1 illustrates the trend toward instructional research focusing on higher levels of processing. Throughout this 10 year period more studies have investigated interactive and transactive comprehension processes than information transfer, and the gap has widened in the early 1980's. The percentage of instructional studies in which the dominant focus was information transfer (word meanings, identifying text structure, etc.) dropped from 39% in the 1975-1979 period to 30% in period from 1980-1984. An opposite trend is seen in the percentage of instructional studies with a dominant focus on interactive or transactive cognitive processes (inferencing, summarizing, etc.). The proportion of studies falling in this latter group rose from 51% to 70% in the same time period. This trend suggests that it is important for teachers to plan reading experiences which encourage students to use higher

Figure 1

PERCENTAGE OF INSTRUCTIONAL STUDIES WITH PROCESSING STRATEGY AS DOMINANT FOCUS



N= 55 studies

levels of processing. Specific instructional techniques designed for this purpose are discussed below in the section on Processing Strategies.

Third, there is a trend toward instruction which encourages readers to develop and become aware of strategies which they can apply in other reading situations.

Once again, when readers are conceptualized as interacting rather than simply reacting to the environment, it is theoretically consistent to devise instructional interventions which help them develop and make use of efficient strategies for dealing with print. Currently, there seems to be an increase in studies investigating the effectiveness of lessons which teach students to consciously select and use strategies for dealing with certain types of texts. This is in contrast to earlier studies which focused mainly on discovering what types of instruction would elicit the desired comprehension behaviors. This newer trend assumes that students, rather than teachers, must be in control of the strategies used.

Pearson and Gallagher (1983) suggest that comprehension instruction should provide for a "gradual release of responsibility from teacher to student" through the use of "guided practice" (p. 22). A recent example is an instructional study by Bean, Singer, Sorter, and Frazee (1983) in which the teacher first demonstrated a three step strategy for the construction of a graphic organizer to be used with the students' world history text. Over the next several months students engaged in guided practice of the strategy in groups and then individually. This allowed them to receive feedback and support as they used the strategy, and to gradually come to use it independently. Instruction which encourages students to monitor their own comprehension has become increasingly more frequent across the 1974-1984 period, and seems to have much to offer in improving comprehension instruction. These strategies are more fully described in the section on Reader Characteristcs below.

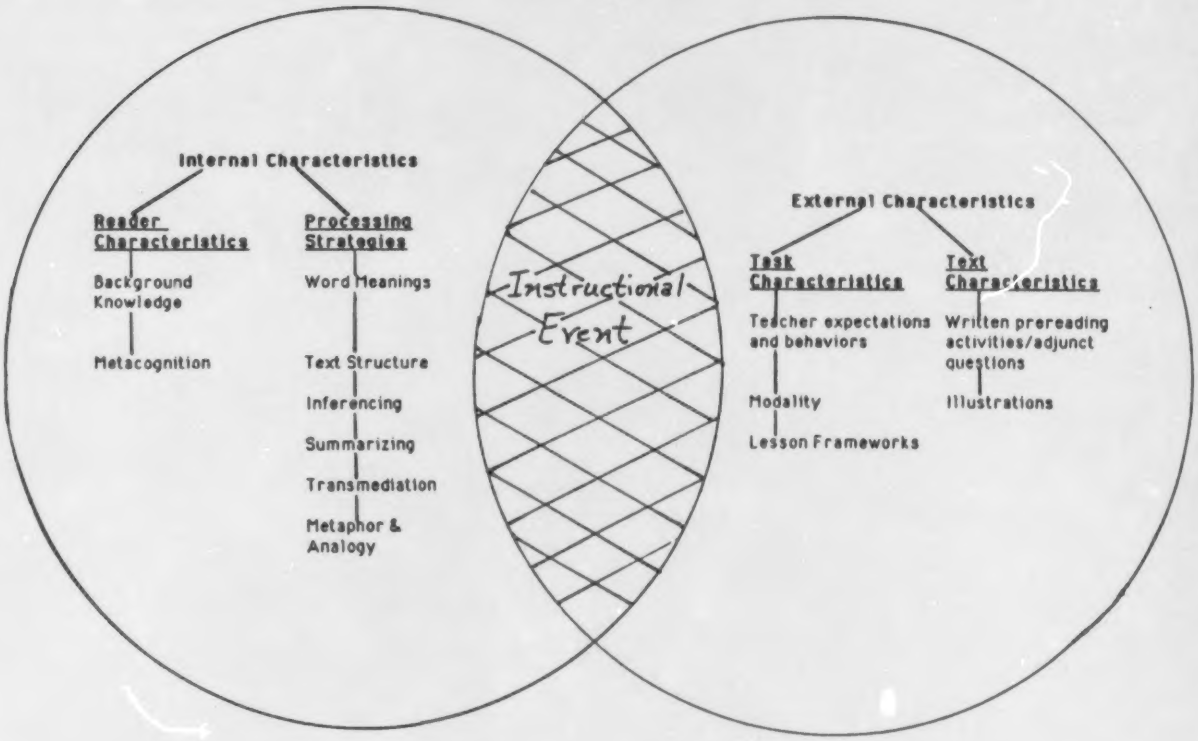
These major trends are also reflected in the instructional issues which reading researchers have investigated with the most frequency in the last 10 years. The next section of this chapter will describe the areas of reading comprehension instruction which have received the most research attention and will present examples of the instructional techniques which have been studied.

SPECIFIC TRENDS IN COMPREHENSION INSTRUCTION

Since the remainder of this paper will discuss trends in instructional research in relation to four major categories, a brief explanation of each one is in order. Figure 2 provides an overview of the categories and subcategories which will be discussed. First, the Reader Characteristics category reflects instances where instruction is designed to affect internal characteristics of readers such as background knowledge, learning style, risk taking, or metacognition (awareness of one's own processing strategies). Conceptually, this category represents characteristics which

Figure 2

TRENDS IN READING COMPREHENSION INSTRUCTION


Internal Characteristics
Reader Characteristics
Background Knowledge
Metacognition
Processing Strategies
Word Meanings
Text Structure
Inferencing
Summarizing
Transmediation
Metaphor & Analogy
Instructional Event
External Characteristics
Task Characteristics
Teacher expectations and behaviors
Modality
Lesson Frameworks
Text Characteristics
Written prereading activities/adjunct questions
Illustrations

the reader brings to the reading situation. The second category, Processing Strategies, reflects the level of cognitive activity which is the focus of instruction. Examples are lower level strategies such as identification of word meanings and factual recall, and higher level strategies such as drawing inferences and summarizing information. Logically, the Processing Strategies and Reader Characteristics categories both reflect internal characteristics of the reader. While this distinction is somewhat artificial it does allow us to describe instructional interventions designed to affect what readers bring to the reading situation as well as the processes they use during reading.

The third and fourth categories, Task Characteristics and Text Characteristics, represent two dimensions of the instructional environment; that is, they reflect elements external to the reader. Specifically, studies discussed in the Task Characteristics category have investigated the effect of instructional directions and procedures. Research related to Text Characteristics focuses on the effect of the print used in instruction.

As seen in Figure 2, these four categories can be divided into a number of subcategories reflecting specific research questions addressed in the last 10 years. The sections which follow will provide a brief introduction to research in each of these categories and subcategories beginning with Reader Characteristics and Processing Strategies, and ending with Task Characteristics and Text Characteristics.

Research Focusing on Internal Characteristics of the Reader

Reader Characteristics

Background knowledge. One reader characteristic that has received considerable attention during the 10 year period covered by this review is the background knowledge possessed by readers. Basic research in this area has shown that the amount of background information possessed by a reader affects comprehension (Pearson, Hansen, & Gordon, 1979; Reynolds, Schallert, & Goetz, 1977) and also that it is necessary for this knowledge to be activated by the reader for it to be helpful (Bransford & Johnson, 1972). Accordingly, researchers have investigated instructional techniques which help readers build necessary background knowledge. One interesting study in this area (Stevens, 1982) used a prereading lecture on the Texan War to provide tenth-graders with background information related to an upcoming passage. Stevens found that this improved subsequent comprehension. Crafton (1983) also obtained positive gains in comprehension by encouraging students to generate their own background information through reading several passages on the same topic.

A number of researchers have also suggested techniques which help students activate the knowledge they already possess. Langer's (1981) Pre-Reading Plan (PReP) is one such activity. She suggests that teachers present a key word, phrase, or picture related to the upcoming reading selection and ask students to say anything which comes to mind. In the class discussion which follows students are encouraged to extend and refine these initial associations.

Metacognition. While the preceding examples deal with the content of the readers' world knowledge, researchers have also become increasingly concerned with students' metacognition or awareness of their own reading strategies. As basic research has shown that good readers monitor their comprehension (Brown, 1980), there has been an increase in attempts to help children become consciously aware of their own processing strategies. Recent examples of such instruction include Cohen's (1983) attempt to teach third-graders to use self-generated questions in order to increase literal recall for short stories, and Winograd, Hare, Garner, Alexander, and Haynes' (1984) use of instruction to train middle and high school students why, when, and where to use the strategy of "looking back" in the text as they read. These are just a few examples of the many studies in our data base which present instruction aimed at making readers consciously aware of effective processing strategies and how to use them.

Processing Strategies

A second category of reading comprehension studies focuses on Processing Strategies. Like instruction aimed at altering background knowledge or encouraging metacognition, studies aimed at affecting students' processing during reading primarily focus on internal characteristics of the reader. It should be noted, however, that it is often the task and text factors which are manipulated to bring about the desired type of cognitve processing. As seen in Figure 2, six processing strategies have received most of the instructional research attention between 1974 and 1984. These strategies will be briefly described and illustrated below.

Identifying word meanings. The first two Processing Strategy subcategories, identifying word meanings and identifying text structure, are lower level strategies which mainly require readers to identify elements explicitly stated in the text. Studies coded as focusing on word meanings include both vocabulary and word identification instruction which has as its goal improving comprehension. Examples of work in this area include a series of studies by Pany and her associates (Pany & Jenkins, 1978; Pany, Jenkins, & Schreck, 1982) in which three methods of vocabulary instruction were investigated: learning meanings from context during reading, provision of meanings by the teacher during reading, and practicing meanings through flashcard drills. Examples of other types of vocabulary instruction which have been investigated are an experience based discussion approach (Vaughan, Castle, Gilbert, & Love, 1982) in which students discussed relations between unknown words and their past experience, and a categorizing method in which students placed an unknown word in a category with familiar words (Gipe, 1978-79).

Identifying text structure. Studies which have taught children to identify text structure are somewhat varied, as they have focused on a number of different levels of text structure. For example, some researchers (Sampson, Valmont, & Van Allen, 1982) focus on syntactic structure through the use of instructional cloze materials in which words are selectively deleted to highlight particular syntactic elements such as adjectives or verbs. Other researchers focus instruction at the level of story structure. Examples are studies which teach students to identify story elements such as setting, theme, plot, and resolution (Gordon & Braun, 1982) or main events, sequence, and cause-effect (Sebasta, Calder, & Cleland, 1982) in attempts to improve story comprehension.

As mentioned earlier, there has been a general trend across the last 10 years to concentrate instructional research at higher levels of cognitive processing. While researchers are still investigating ways to improve literal level comprehension skills, they have become increasingly aware that readers must be able to draw inferences, summarize and identify major themes, make use of other communication systems (e.g.,illustrations, mental imagery), and comprehend metaphors and analogies. Without these processing skills, readers truly are little more than functionally literate. Certainly they would be unable to use reading to stimulate learning and thinking in the manner demanded by a highly technological society. It is therefore not surprising that attention should turn to developing instructional methods which foster the processing strategies readers use to go beyond the elements explicitly stated in texts.

Inferencing. In a recent paper describing the process of reading comprehension from a schema-theoretic view, Anderson and Pearson (1984) state that inferencing is one of the key elements in this process. They suggest that in order to understand all the explicit information in a text, "interpretations must be made that often go well beyond the text itself" (p. 38). These inferences are necessary because authors never make all the relations in the text fully explicit. Instead, they assume that readers will fill these gaps with their background knowledge. To illustrate, let me return to my earlier example in which a student is reading a passage about a party. It is quite likely that the author will not mention in the text that the boy who arrived at the door was previously invited by a phone call or a written note. Still readers are expected to use their knowledge of parties and the invitation process to understand dialogue where the host greets the boy with, "We were expecting you!". Thus, readers are called upon to infer unstated connections and information by linking textual cues to their background of experience.

Congruent with the importance of inferencing in schema-theoretic views of reading comprehension is our observation that slightly more than one-fourth of the instructional studies focusing on Processing Strategies had a dominant focus on inference instruction--more than any other Processing Strategy subcategory. Researchers have explored a wide variety of instructional techniques to promote inferencing during reading. One suggestion has been to provide children with increased practice in answering inferential as opposed to factual questions (Hansen, 1981). Another example of work in this area is the use of cloze techniques (Carr, Dewitz, & Patberg, 1983) which require readers to make inferences based on the syntactic and semantic cues present in the text and on the background knowledge they already possess. While these and other studies have focused on direct teaching of inferencing, other exciting instructional apporaches are currently being investigated. Greenlaw (in progress) is currently investigating the use of high fantasy literature coupled with creative/critical reading and writing activities in an attempt to encourage inferencing.

Summarizing. A fourth Processing Strategy category which is well represented in the instructional research of the past decade is that of summarizing, (i.e., determining the gist or theme of a written text). As used here, summarizing entails much more than simply identifying the topic sentence of a text. Readers are required not only to identify important text elements, but often to infer major themes and points which are not explicitly stated in the text. In order to form a coherent summary, Kintsch and van Dijk (1978) suggest that readers must apply the strategies of deletion, generalization, and construction to the information available in the text. An example of classroom instruction using these summarizing strategies is reported by Taylor (1982). In her study, fifth-graders were taught to prepare and study a hierarchical summary for a passage from their health book. These students were first taught to prepare a skeleton outline of the segment which closely followed the text's organizational structure, and then to generate a summary statement for every paragraph, section, and subsection of the text. Bean, Singer, Sorter, and Frazee (1983) used a similar strategy with tenth-graders. The major difference being the use of a graphic organizer instead of an outline. These and other techniques aimed at increasing students' ability to comprehend the theme of a text are currently receiving considerable attention.

Transmediation. The final two Processing Strategy subcategories to be discussed here are transmediation and metaphor and analogy. Both can be considered transactive processes because they require the reader and text to come together in such a way that totally new meanings are created and both reader and text are changed in the process. Transmediation requires the reader to move from one communication system to another; that is, readers first express a meaning in written language and then through another sign system such as mental imagery, art, music, dance, math, etc. Through transmediation, readers re-represent knowledge they have gained through reading. Because each communication system has its own expressive strengths and limitations, the process of transmediation encourages readers to see their knowledge in a new light and to create new understandings as well as connections between existing and newly formed concepts. The most frequent instructional activities requiring transmediation come from studies which ask students to use mental imagery or art to represent what they have read. For example, Pressley (1976) trained children to "make pictures in their heads" about the stories they had read, and Lesgold, McCormick, and Golinkoff (1975) asked students to illustrate passages with stick figure cartoons. These studies and others, such as Siegel's (1984) introduction of a strategy where students respond to reading through art, are representative of instructional techniques involving transmediation.

Metaphor and analogy. Instructional strategies using metaphor and analogy have also generated considerable interest in the late 1970's and early

1980's. Hayes and Tierney (1982) note that comprehension may be aided by the use of analogies because readers can transfer the properties of known concepts to unknown ones. In this way, new knowledge categories can be created and links between them are formed. Examples of instructional applications of analogy and metaphor are studies by Hayes and Tierney (1982) and Linden and Wittrock (1981). In the former study, the researchers presented information about the unfamiliar game of cricket in passages which also contained analogies to the familiar game of baseball. The attempt in this lesson was to help readers link the new information on cricket with their existing background knowledge through provision of explicit analogies in the text. Linden and Wittrock, on the other hand, asked students to generate their own metaphors and analogies in order to relate the text to their personal experiences.

Summary. In summary, the Reader Characteristic subcategories of background knowledge, and metacognition ,and the Processing Strategy subcategories of word meanings, text structure, inferencing, summarizing, transmediation, and metaphor and analogy are the focus of most of the instructional research dealing with internal characteristics of readers during the 10 years under study. The research questions addressed are reflective of the three major trends presented earlier in this chapter. Readers are seen as actively constructing meaning by using their current knowledge about the world, applying a variety of cognitive strategies, and monitoring their own comprehension. This view obviously has strong implications for reading comprehension instruction. Teachers may want to further investigate some of the areas outlined above, as many interesting suggestions for improving classroom comprehension instruction are included in these research reports.

Research Focusing on the Instructional Environment

While the studies reported thus far have primarily focused on interventions designed to affect the internal characteristics of the reader, our data base also contains instructional studies in which features of the instructional environment are especially highlighted. These studies fall into the Task Characteristics and the Text Characteristics categories. Naturally, any task or text manipulation may also be expected to affect the reader's processing. In fact, the studies reported as having a dominant focus on Reader Characteristics or Processing Strategies often manipulated the text or task in the instruction as well. However, it seems clear that some studies are designed explicitly for the purpose of testing the effect of some particular feature of instructional tasks or texts. These studies will be discussed under the headings of Task Characteristics and Text Characteristics, with the understanding that we also recognize that these manipulations affect internal reader characteristics.

Task Characteristics

Teacher expectations and behaviors. Instructional research on reading comprehension during the last 10 years seems to fall largely into three Task Characteristics subcategories, as seen in Figure 2. The first subcategory contains a group of studies which investigate the impact of teacher expectations and behaviors. For the most part this group of studies involves the effects of teacher behaviors such as questioning techniques (Gall, Ward, Berliner, Cahen, Winne, Elashoff, & Stanton, 1978), correction of errors (Kibby, 1979), or emphasis on oral reading accuracy (Furniss & Graves, 1980). These studies are especially interesting because they provide evidence concerning the impact of teachers' instructional behaviors.

Modality. A second task factor which has been the subject of a number of investigations is the impact of the modality through which children encounter a text. Examples are studies which contrast comprehension under instructional conditions of silent versus oral reading (Wiesendanger & Birlem, 1981) or of listening versus reading (Marlowe, Egner, & Foreman, 1979). Once again these studies address a question which is relevant to many instructional decisions made by teachers.

Lesson frameworks. The third subcategory of Task Characteristics is labeled lesson frameworks. This is a term borrowed from a recent review of comprehension instruction by Tierney and Cunningham (1984) and generally refers to studies which investigate the effects of comprehension lessons containing steps which: (1) establish a purpose for reading, (2) require students to read a passage, (3) require students to perform a task which reflects the accomplishment of the reading purpose, and (4) provide feedback concerning comprehension based on task performance. Most of the instructional lesson frameworks included in this category contain some or all of these steps and can be considered guides for planning comprehension lessons.

Many of the lesson frameworks which have been investigated in the past decade have also been incorporated into published basal reading lessons, or are a modification of widely used guided reading lessons. An example is the guided reading strategy used by Bean and Pardi (1979) which is a combination of the Guided Reading Procedure used by Manzo (1975) and the initial steps of Robinson's (1970) SQ3R study procedure. Bean and Pardi instructed students to: (1) survey a section of the text by reading only the titles, charts, etc.; (2) orally retell everything they remembered from the preview; (3) recheck the chapter for missing information; (4) organize this information into an outline; (5) read the text silently; and (5) complete a true-false quiz on the textual material. Another example is a study by Biskin, Hoskisson, and Modlin (1976) which contrasts Directed Reading-Thinking Activities (DR-TA) in which children make predictions about story content with Reflective Reading-Thinking Activities (RR-TA) in which the emphasis is on evaluation and interpretation of stories. These are just two examples of the many studies in our data base which investigate the effectiveness of particular types of comprehension lessons. Since many of these strategies are similar to the guided reading lessons in current use, this may be an area where teachers can find suggestions which are immediatly applicable to their comprehension instruction. Examination of researchers' rationales for making these modifications, should also help teachers think about their own instruction in new ways.

Text Characteristics

The fourth major category of instructional studies focuses on Text Characteristics; that is, they study the effects of the printed texts used in instruction. Overall, only a small percentage of instructional studies have text factors as their dominant focus. Instead, most of the studies in our data base with a dominant focus on text manipulations are primarily interested in investigating students' processing strategies by presentation of altered texts, or determining the effects of a particular text feature such as the repetition of concepts, figurative language, syntactic complexity, or story structure on comprehension. While many of these studies do not fit the definition of instruction used in this paper (i.e., an intervention that is designed to be used with students in classrooms), they are important in two ways. They provide information which is helpful for the authors of instructional materials, and they highlight the need for teachers to plan instructional strategies which help students deal with particular features of the texts they read.

Written prereading activities/adjunct questions. Instructional studies have been primarily focused on the effects of two types of Text Characteristics: written prereading activities/adjunct questions, and illustrations. In the first of these subcategories, written prereading activities/adjunct questions, researchers have focused on repeating or highlighting some feature of the text by the use of structured overviews, advance organizers, titles, headings, or written questions inserted in the text. Many of these instructional techniques involve presentation of a written prereading activity designed to help students link the upcoming text to their background knowledge and to make predictions about its content. Representative of the studies in this area are Bean's (1978) use of a structured overview and Royer and Cable's (1975) presentation of two conceptually related passages. In the former study a structured overview consisting of a hierarchically organized overview of the upcoming passage was presented as a guide to prereading discussion. In the second study the researchers presented a passage which discussed a topic in concrete terms before introducing a passage containing a more abstract discussion of the same topic.

A second group of instructional studies in this category investigates the effects of presenting written questions before, after, or embedded in a reading selection. These techniques are commonly labeled adjunct questions. Two examples are studies using postreading questions of different types with fifth-graders (Wixon, 1984) and with undergraduates and Navy enlisted men (Ellis, Konoske, Wulfeck, & Montague, 1982). Since teachers have been observed to make considerable use of questioning during reading lessons (Durkin, 1978-79; 1984), information on the effects of inserting different types of written questions at various points in texts may also be of special interest.

Illustrations. The last Text Characterisics subcategory providing information directly relevant to instruction, is research on the effects of illustrations. An important research question has been whether illustrations facilitate or detract from students' learning. An example is a study by Hayes and Readence (1982) where the comprehension of eighth-graders is compared when texts are presented with and without illustrations, and also with and without instructions to attend to the illustrations. Another interesting study (Cohen & Stover, 1981) investigated the effect of accompanying math word problems with diagrams. Studies in this area may be especially interesting for teachers involved in designing their own instructional materials or selecting published materials for use in their classrooms.

Summary. The most heavily researched features of the instructional environment have been the Task Characeristics of teacher expectations and behaviors, modality, and lesson frameworks and the Text Characteristics of written prereading activities/adjunct questions, and illustrations . Like research on internal reader characteristics, studies of the instructional environment have increasingly come to reflect the active role of readers. In the past, manipulations of the instructional environment were based on the behaviorist notion that task and text features simply elicited responses from readers. Much of the newer work in this area incorporates the schema-theoretic notion that comprehension is a result of an interaction or transaction between readers, texts, and tasks. Investigation in this area offers some insight into the manner in which instructional tasks and texts affect reading comprehension.

CONCLUSION

In this chapter I have presented an overview of some of the major trends in research on reading comprehension instruction during the period from 1974 to 1984. I have also introduced the areas receiving the most research attention and provided a few examples of the instructional techniques which characterize work in each area. Like many guided tours, little time has been devoted to in-depth investigation of any of these areas. Instead, I have chosen to provide a glimpse of the most important landmarks, hoping this will give readers enough familiarity with the territory to revisit those areas which seem most interesting on their own.

For readers who now wish to seek out detailed descriptions of instructional lessons, there are two ways in which this volume may be of help. First, members of our research team have reviewed and critiqued instructional techniques in each of the remaining chapters. Each of these authors provides descriptions of some of the instructional interventions which researchers have investigated during the past decade. In cases where readers feel the need to directly consult the research reports cited in these reviews, Appendix C provides full bibliographic information on all 573 reading comprehension studies in our data base.

A second approach to this body of research is made possible through the information contained in Appendix B. Here readers will find a list of hypotheses which positively state the major aims of research in each of the categories of our taxonomy. In addition, under each hypothesis is listed all of the studies which have been coded as having a dominant focus in that category. With this information, readers can consult the main bibliography in Appendix C, and find the information necessary to locate the studies. In this volume we have attempted not only to present our own conclusions about research in the area of reading comprehension, but also to make available to our readers the data base from which we have worked. Hopefully, with a general notion of "what's out there" and "what has already been tried" readers will be able to further explore those techniques which seem best fitted to their current instructional needs or research interests.

Chapter 5

UNCHARTED LAND:
READING COMPREHENSION RESEARCH WITH THE SPECIAL EDUCATION STUDENT

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INTRODUCTION

In October of 1984, several hundred classroom teachers and school administrators gathered at Indiana University's Memorial Union to attend the annual Fall Language Arts Conference. At 9:30 a.m. a subset of this group attended a session on reading comprehension research with special education students. The presentation began with an invitation for audience participation.

"We've spent the last 12 months reviewing reading comprehension research," the panel began, "but rather than present findings that you may not consider especially relevant to your particular teaching situation, we'd like to turn this session over to you, to invite you to raise the kinds of questions that more concern you. And we'll do our best to answer them for you."

One panel member stood at the chalkboard ready to record the questions. "How much phonics instruction should special children receive?" was the first question raised.

"I have a question about teaching vocabulary." began a second member of the audience. "Should I introduce new words before or after I have the kid read the story?"

A participant standing in the far corner of the room had a question about controlled vocabulary. "Is it really best to use short sentences with students? I mean, is there any new information about controlling vocabulary? Should we be concerned about it or not? No one seems to know."

The "secretary" was barely keeping up with the questions that were being generated and more and more hands were going up.

"What about comprehension? When should it be introduced?", a local elementary special education teacher asked.

"And what about reading methods in general?", asked another teacher. "What really is the most successful method of teaching kids who have been labeled as handicapped?"
(scenario by Jean Anne Clyde, 1985)

In October 1983, which is when our research began, our intent was to provide well documented answers to the these kinds of questions. A year and a half later, we find that instead of having many well supported answers, we have a few tentative answers and a great many questions. The explanation is simple: In our search of the literature, we were able to locate 574 reading comprehension studies and only 45 of the 574 involved special education students. We had not anticipated this scarcity. Special education students are students at "high risk" - we had hoped for an extensive research base on which to ground instructional recommendations. We found that such a base does not exist.

We were unable to locate any studies with students labeled emotionally disturbed and identified only four studies with the hearing impaired and four with the mildly mentally handicapped. It seemed impossible to generalize from such a limited research base.

There were 37 studies done with students labeled learning disabled - which included one study done with two hyperactive learners. Generalization here seemed equally impossible as much controversy exists as to whether or not the label learning disabled identifies a homogeneous population. It has been suggested that the criteria for labeling varies from school district to school district (and sometimes from one school to another within the same district).

Reading comprehension research with these special education students had just begun; most of the studies had taken place since 1980. The landscape was virtually uncharted.

Although we did not find the answers we expected, we 1) did gain an understanding of what research has been done, 2) learned enough so that we can talk about what is possibily helpful and 3) identified implications for both research and instruction.

It is these topics that will be explored in this paper. The first section - a survey of the research - has been subdivided into specific handicapping conditions. The second provides a brief synthesis across handicapping conditions while the third and fourth sections of the paper - implications - focus on the questions this review generates for instruction and for research.

This paper is intended to prompt researchers and theoreticians to turn at least some of their attention to reading comprehension with special education students. Our research has led us to believe that reading comprehension instruction with these students is proceeding without either a research base or an explicit theoretical base. This is important because it suggests that those students who appear to need the most support may be getting the least.

A Survey of the Research

Research with the Mildly Mentally Handicapped (MiMH)

Descriptive Studies. Bos and Tierney (1984) compared the quantity and quality of inferences generated by retarded and non-retarded students reading at the intermediate level and found that while both groups generated the same number of inferences, the inferences generated from expository material were qualitatively different. The mildly retarded students generated fewer plausible inferences and more implausible ones. However, there was no significant difference between the quality of the inferences generated on the narrative material. Bos and Tierney suggest that this study "lend(s) support to the notion that retarded students are engaging in the cognitive processes necessary for generating inferences" (p.80) and conclude that the differences between the groups appears to be an artifact of instruction in that special education students may not have the opportunity to read, and thus develop schema for, expository text.

Healy (1982) focused on describing those students having hyperlexia - "a unique disorder in which children notably delayed in language and cognitive development begin spontaneously to recognize words at a very early age and continue to develop surprisingly advanced word recognition skills" (p. 319). The twelve students described by the study were characterized as having difficulty with comprehension above a literal level and as being "deficient in formation and organization of schemata for incoming experience" (p. 319).

Instructional Studies. Two of the studies involving students labeled Mildly Mentally Handicapped (MiMH) sought to improve the learner's ability to answer literal and inferential questions (Peleg and Moore, 1982; Samuels, Dahl, and Archwamety, 1974). Peleg and Moore (1982) were interested in understaanding the effectiveness of advance organizers. An advance organizer, as described by Peleg and Moore,

> is actually an introduction presented to learners before the material to be presented. The introduction contains an overview of the structure of the unit of instruction and also creates a connection between the new material to be learned and information already in the learner's cognitive structure. (p.621)

Peleg and Moore provided 96 students labeled Educably Mentally Retarded with an advance organizer introduction, a traditional introduction or no introduction and asked the students to either read or listen to a 1000 word passage about monkeys. The researchers found that students receiving the advance organizer introduction to written text answered more literal and inferential questions correct than did the students in the other two treatment conditions.

Samuels et.al. (1974) taught 30 mentally retarded students (mean I.Q. 72) a hypothesis-test method of word recognition. Their method was based on Samuels' partial model of word recognition.

> According to the partial model of word recognition, four stages are involved in recognizing a target word. In the first stage the words preceding the target word are read for meaning. This information is used in the second stage to generate one or more hypotheses as to the identity of the target word. In the third stage, visual information consisting of one or more letters is picked up from the target word and tested against the predicted word. In the final stage, the hypothesis is accepted or rejected depending on whether the word fragments perceived match the target word. Speed of recognition is determined partly by the amount of visual information from the target word necessary for verifying a prediction. The less visual information required, the faster is the recognition. (p. 836)

Students received 4 hours of training per week for 14 weeks. They were trained on the subskills that task analysis had determined were involved in each of the four stages. On a modified cloze test given to assess comprehension, the students in this hypothesis test treatment group did significantly better than the students in the control group. These students were also better able to determine word meaning in ambiguous contexts.

Research with the Hearing Impaired

Descriptive Studies. Ewoldt (1981) sought to investigate the reading strategies of deaf readers as opposed to hearing students. Her study suggested that both groups of readers used similiar strategies. These strategies include "predicting, chunking, using their own dialect, using peripheral field information, and developing concepts through reading." (p. 945)

Instructional Studies. Malcolm, Albertini, Burke, and Humphrey (1980) were interested in the teaching environment; they wanted to see if comprehension was facilitated by inter-disciplinary teaching. In the treatment group

> the first lesson in each set of four was taught by an audiologist and included speech reading practice using a special light and switch assembly. This allowed the audiologist to alternatively have a light shine on her

> face or have the printed passage appear on the video screen...The third lesson in each set of four was taught by a speech pathologist. Individual words on the glosssynograph were replaced with cards and students asked each other prepared questions. (p. 436)

An English teacher taught the second and fourth lessons for the treatment group and all the lessons for the control group. Studying the results of the fourteen week instructional program, the researchers concluded that students receiving inter-disciplinary instruction had higher comprehension scores.

McGill-Franzen and Gormley (1980) and Robbins (1983) were interested in the influence of context on the comprehension of hearing-impaired students. McGill-Franzen and Gormley found that students understood passive sentences better when they were embedded in context. Robbins reported that students answered more literal and inferential questions correctly when provided with a text that contained both sign language pictures and English.

Research with the Learning Disabled

Before discussing the research in this area, it is critical to elaborate on an issue raised in the introduction: the controversy that exists concerning the label of learning disabled. Friedrich et.al. (1984) suggest the possibility that "learning disability, as presently and loosely defined by federal and state criteria, does not exist as a unique psychological entity" (p.209) while Bognar and Martin (1982) note that the entire process of labeling students is without a theoretical base. Other researchers (Berk 1984, Killen & Myklebust 1980) criticize the discrepency method of identifying these learners as being neither valid nor reliable; that it neither distinguishes students as it claims, nor does so consistently. The use of subtest scores on the WISC-R (Weschler Intelligence Scale for Children-Revised) has also been critiized as having validity for groups, but not for individuals. In other words, while "there may be a characteristic WISC-R profile for learning disabled individuals as a group, few individual learning disabled students may actually conform to this pattern" (Dudley-Marling, Kaufman, and Tarver, 1981, p. 318).

It has also been suggested that the population labeled learning disabled is not a homogeneous population and that it should not be studied as such (McKinney, 1984; Norman and Zigmond, 1980; Ryckman, 1981). While some advance the idea that subgroups should be identified (McKinney, 1984; Ryckman, 1983), still others accept the position of Ysseldyke, Thurlow, Graden, Wesson, and Deno (1984) who suggest that in studying students labeled learning disabled

> researchers have compiled an interesting set of findings on a group of students who are experiencing academic difficulties, who bother their regular

> classroom teacher and who have been classified by societally sanctioned labelers in order to remove them, to the extent possible, from the regular classroom mainstream." (p.89)

Given the extent and intensity of the controversy, it seems best to consider the research reviewed below as research on students who are neither physically nor mentally handicapped, but who are not experiencing academic success.

Thirty-two of the thirty-seven studies have taken place since 1980 and most are instructional studies. For the purposes of this review, the thirty seven have been categorized by their primary focus: text, reader, processing strategy or task.

Research with the Learning Disabled: Text as dominant focus

Descriptive Studies. Armstrong (1983) was interested in the relationship of material difficulty to reading comprehension scores. He provided 5 students with two different levels of Barnell Loft and found that students answered fewer questions correctly on the more difficult material.

Instructional Studies. Harber (1983) hypothesized that illustrations would interfere with the reading comprehension scores of learning disabled students. The Gray Oral Reading test with illustrations, without illustrations or with partial illustrations was given to 76 learning disabled and normally achieving elementary school children. The results suggest that the illustrations, both partial and full, had a detrimental effect on the scores of the learning disabled students in the middle and high reading groups.

Research with the Learning Disabled: Reader as dominant focus

Descriptive Studies. Dowdy, Crump, and Welch (1982) established different purposes for reading and found that learning disabled students in grades four and seven adjusted their rate to the purpose for reading while those in the tenth grade did not. The flexibility of non-labeled learners remained consistent across all three grades. (Dowdy et.al. (1982) also reported on the comprehension scores and reading rates of these two groups; those results are discussed in the next section under rate.)

Griffin, Walton, and Ives (1974) compared the eye movements of good (non-labeled) readers with poor (learning disabled) readers and found that saccades (eye movement patterns) could not be used to differentiate the readers.

Bos and Filip (1984) were interested in comprehension monitoring strategies. Students from both populations, matched on grade level, read an expository passage that contained text inconsistencies (contradictory sentences embedded in a paragraph) in both a cued and non-cued condition. The students in the cued condition were told

> There is something tricky about this essay. There is something that does not make sense and is confusing. I would like you to try and spot the problem with the essay and tell me what it was that did not make any sense. (p. 231)

In the standard condition, students were not given this forewarning. After the students read the passage, both groups were asked probed questions. The results of this study suggested that while there were significant differences in the non-cued conditions, there were not significant differences between the two groups in the cued condition. It appeared that while learning disabled students did not spontaneously use comprehension monitoring strategies, when cued, they were able to do so effectively. There were no significant differences between the performances of the normally achieving students in the two conditions.

Kavale (1980) gave learning disabled and normally achieving students, matched on grade level, 40 multiple choice questions (cause and effect, verbal reasoning, inference and main idea) and asked the students to "describe aloud the reasons for accepting or rejecting each of the possible choices" (p.39) Kavale analyzed the results and found that the students reported seven distinct reasoning strategies. When he compared the reports of the two groups, Kavale found that the learning disabled students frequently did not report a strategy (20% of the time) and that, when a strategy was reported, the students often named strategies that were not particularly effective - that is, that led to few correct responses.

In another comprehension monitoring study, Taylor and Williams (1983) asked learning disabled and normal elementary age students to identify text inconsistencies and reported that, when students were matched on I.Q. and reading vocabulary, there were no significant differences between the two groups. (Both groups also displayed similar success in identifying main ideas).

In the remaining three reading strategy studies (Clark, Deshler, Schumaker, Alley and Warner, 1984; Schumaker, Deshler, Alley, Warner and Denton, 1982; Wong and Jones 1982), researchers explored this hypothesis by focusing on the effect of teaching learning strategies.

Instructional Studies. Clark et.al. (1984) taught a visual imagery strategy and a self-questioning strategy to secondary learning disabled students. To learn to use visual imagery, students were taught to read the first sentence and to create a visual image of the content of the sentence. Students were then told to describe their image. If they could not make an image, they explained why they could not and then went on the the next sentence. If they could make an image, they were told to "decide if is the same as an old image..., the old image changed somewhat or an entirely new image" (p.146). They were then instructed to check their image for completeness. This pattern was repeated throughout the story.

Self questioning was taught by having the students ask and answer their own Wh- questions as they read. The researchers found that the learning disabled students were able to master both strategies with relatively little instruction (2 to 4 hours per strategy) and that students were then able to apply these strategies both to ability level material and to grade level material. (The mean discrepency between ability level and grade level was 4.2.) Posttest scores on grade level material averaged 81.7% (with a pretest mean of 45.0%) for visual imagery and 89.8% (pretest mean of 46.0%) for self-questioning.

Schumaker et.al.(1982) wanted to help students "gain information from textbook chapters" (p.235). They devised a strategy called Multipass which, once mastered, the students could use independently. The steps in Multipass, called passes, are Survey, Size-Up and Sort-Out. In Survey, the student reads the introductory paragraph, reviews the table of contents to understand the relationship of the chapter to the rest of the book, reads the subtitles of the chapter to understand its organization, scans the illustrations and reads the summary paragraph.

In the Size-Up pass, students read the chapter questions, indicating with a check mark those questions for which they already know the answer. They then read through the chapter searching for clues to questions. Answers to questions are paraphrased as are all the facts and ideas the student can recall about the chapter.

In Sort-Out, students test themselves on the chapter, using chapter questions. If a student can not answer a specific question, he/she is told to think of the section in the chapter where the answer would most likely appear and skim that section to find the answer.

Schumaker et.al. (1982) report that learning disabled students were able to effectively master this strategy and that their scores on content area chapter tests improved.

Wong and Jones (1982) also investigated the effect of self questioning training on the reading comprehension of secondary students. These students were told to a) ask themselves why they were reading the passage, b) find the main idea, c) think of a question about the main idea, d) learn the answer to their question and e) "...look back at the questions and answers to see how each successive question and answer can provide you with more information" (p.231). Their results showed that students who received this training answered more comprehension questions correctly than did the untrained group. (Wong and Jones also reported that the effect of training was positive for non-learning disabled students, although not significant.) The researchers note that their results "do not suggest that learning disabled adolescents have an ability deficit in terms of insufficient metacomprehension skills (but) rather...our findings are interpreted as having pinpointed another aspect of learning disabled students' cognitive and metacognitive inactivity within the domain of reading comprehension" (p.238).

Research with the Learning Disabled: Processing strategy as dominant focus

Descriptive Studies. There are eight studies which have been coded with processing strategy as its dominant focus. These are generally correlational studies. Researchers want to understand the relationship between reading comprehension and oral language, oral reading behavior, knowledge of syntax, retellings or vocabulary.

Pflaum (1980) focused on the relationship between oral reading behaviors and reading comprehension. She asked 76 learning disabled and non-learning disabled students to orally read a 30 word passage and then to retell the story. Pflaum concluded that when reading level and age were used as covariates, oral reading behaviors could not be used to predict comprehension.

Reid and Hresko (1980) investigated the relationship between oral language and early reading in both learning disabled and normally achieving students. Testing five, six and seven year olds, the researchers found that there was a correlation between oral language and early reading. Older students scored higher. The scores of students labeled learning disabled students were not as high as their chronological peers.

Hansen (1978) compared the retelling scores of 34 fifth and sixth grade learning disabled and normally achieving students with their comprehension scores and found a positive correlation.

Cartelli (1977), Jenkins, Larson, and Fleischer (1983), Pany, Jenkins, and Schreck (1982) and Pany and Jenkins (1978) were interested in the relationship between word knowledge and reading comprehension. Cartelli (1977) found that teaching paradigmatic (associationl) language structures resulted in higher scores on the Metropolitan Reading Test for 46 learning disabled primary students.

Jenkins et.al. (1983) established two treatment groups - word supply and drill. The results of this study suggested that students in the drill condition had higher comprehension scores on sentence maze exercises than those in the word supply treatment.

Pany and Jenkins (1978) were interested in how word knowledge could be best acquired, relative to improving reading comprehension. Four treatment conditions were established -

meanings from context, meanings given, meanings practiced and control. The researchers found that vocabulary knowledge was helpful in helping students recognize and give synonyms for target words in sentences, but that there was not a correlation between treatment and scores on factual recall questions. Vocabulary knowledge did not appear to affect passage comprehension. In 1982, Pany, Jenkins and Schreck established the same four treatment groups and concluded that vocabulary was useful in sentence comprehension but not effective in improving cloze scores or in retellings. It was suggested that either different types of vocabulary training might be needed for prose comprehension or that

> The presumed importance of vocabulary knowledge may have been somewhat overestimated...Perhaps readers can tolerate an unexpectedly high proportion of unfamiliar words without suffering comprehension losses. This explanation seems particularly plausible if the reading passages are ones for which the students already possess well developed knowledge structures or schemata. When faced with passages based on familiar themes, readers may need only to detect sufficient fragments of information to recognize the theme and construct the authors intended meanings based on their own 'knowledge recipes' or schemata (Anderson, 1976). In any case, the presence of unfamiliar words in the current passages may not have resulted in the intended disruption of comprehension. (p.214)

White, Pascarella and Pflaum (1981) sought to investigate the relationship of syntactic understanding to reading comprehension. They taught students to combine single words into coherent sentences (anagram treatment) or to analyze sentences syntactically (sentence construction treatment). They found that students in the anagram treatment had higher cloze scores on a passage from Boning's Getting the Facts than did students in the sentence construction treatment. However, "the greatest achievement benefits associated with the anagram treatment...accrued to those students with higher initial reading achievement. As level of pretreatment decreased, the magnitude of the treatment differences also tended to decrease." (p. 697)

Research with the Learning Disabled: Task as dominant focus

Descriptive Studies. Ysseldyke, Thurlow, Mecklenburg, and Graden (1984) collected data on reading comprehension instruction in 34 regular and special education classrooms. Similarities were found in time allotted to task (60.8 and 65.7 minutes per day), and distribution of that time (in rank order: basal reader textbooks, worksheets, and workbooks). Both groups spent similar amounts of time receiving small group instruction and while the special education received 14 more minutes of individualized contact (15.4 minutes for special education students, 1.3 for regular education), there was not a significant difference in the amount of instruction provided.

Regular education teachers spent more time in front of the class; special education teachers spent more time at the side of the student. Special education students received more teacher approval than regular education students. Most student time in both groups was spent passively although special education students spent more time reading aloud and discussing their course work.

Leinhardt, Zigmond, and Cooley (1981), involved observing 105 students in 11 classrooms for the learning disabled. The researchers wanted to understand what classroom factors influenced reading comprehension improvement. The researchers noted variation both in teacher and student behavior: while the mean time for teacher instructional behavior was approximately 16 minutes, some students received almost none of that time while others received almost 30 minutes. Some students spent as much as 160 minutes of the day reading, while one spent none.

Multiple regression analysis was used to understand the relationship between "how the activities the students engaged in affected their test performance and how a variety of instructional features influenced student behavior" (p. 352). From this analysis, the researchers concluded that silent reading time significantly contributes to gains on reading comprehension measures. They noted that

> increase of 5 minutes per day would be equivalent to about one month (on a grade equivalent scale) of additional reading achievement. (p.355)

Instructional Studies: Programs. Cornelius and Semel (1982), Cox and Wilson (1981), Lovitt and DeMier (1984) and Stockdale and Crump (1981) focused on instructional programs. Cornelius and Semel (1972) found that the scores of students who received summer school instruction did not regress as did the scores of those students not enrolled in summer school. Cox and Wilson (1981) compared the reading achievement of students in three program structures: learning centers, regular classrooms with outside support and self-contained learning disabilities classrooms and found that the students receiving the individualized instruction offered by the latter made more gains than the students in the other two structures. Lovitt and DeMier (1984) compared the gains made by students instructed by the Sullivan program versus the Slingerland method and found no significant differences.

Stockdale and Crump (1981) followed the progress of one student (labeled learning disabled) over a four year time period. The student began with an emphasis on phonics, switched to a sight word emphasis and was taught with a "modified holistic emphasis" during the last year. The results of their study suggest that the student evidenced the most progress when he was in the modified holistic program and that he "indicated a more positive attitude for the activity" (p.405) during this instructional time. The researchers describe this program as follows:

> During Lee's first reading session, the LD specialist selected reading materials that were of interest to him and that contained predictable language. The books chosen were at Lee's instructional reading level in order to develop his ability to predict, confirm and integrate the information read. Lee selected a book of interest and as he read, the LD specialist encouraged him to ask the following questions as suggested by Goodman and Burke (1972) "Does what I am reading make sense?" "Does it sound like language?" "What should I do if it doesn't make sense?" (p.404)

Based on the results of this study, Stockdale and Crump suggest that "teachers should encourage students to guess, to take risks and test their hypotheses. Student errors should be regarded as cues they may employ to make sense of what they read." (p.405) They further note that "a critical consideration in reading instruction for learning disabled students is to make them aware that reading is language and that reading is meaningful" (p.405).

Instructional Studies: Modalities. Cook and Welch, 1980; Dubey and O'Leary, 1975; Punnett and Steinhower, 1984; and Wiseman, Hartwell, and Hannafin, 1980 investigated differences in modalities. Cook and Welch (1980) developed three treatment programs: auditory training plus reading, visual training plus reading and reading only. The two treatment groups received training in their diagnosed deficit. For example,

> Students within the Auditory Deficit/Auditory Training group who showed deficits in Auditory Memory on the G-F-W (Goldman-Fristoe-Woodcock Auditory Skills Test Battery) were given exercises from Developmental Learning Materials, Auditory Memory Program of the Auditory Perceptual Training Program or activities recommended by Bush and Giles (1969) for auditory association or auditory sequential memory. (p.78)

The research report did not include a description of the reading instruction. After forty hours of instruction, no significant differences were noted.

Dubey and O'Leary (1975) found that the two hyperactive boys they studied got more comprehension questions correct when they read orally instead of silently.

Punnett and Steinhower (1984) provided either ocular training with or without reinforcement to four students. Two other students served as controls; these students were allowed to play during the training sessions. The researchers report that, as a result of training, the number of regressions decreased as did the number of saccades. Comprehension scores for the treatment groups increased while scores for the control group decreased. Punnett and Steinhower note that their study provides "weak evidence for the efficacy of vision training as a treatment for reading handicapped students" (pg.19).

Wiseman et.al. (1980) compared the reading comprehension of 50 secondary students labeled learning disabled and concluded that students generally did as well or better when listening than reading, but noted that there was great variability in individual performance.

Instructional Studies: Rate. Dowdy, Crump, and Welch (1982) compared the reading rates and comprehension scores of learning disabled and normally achieving students at three grade levels and concluded that the learning disabled students had slower reading rates and lower comprehension scores. The researchers argue that learning disabled students "may be overly dependent on print and that the slow word processing rate may interfere with comprehension" (p. 260). Dowdy, Crump, and Welch do not offer a hypothesis to explain this observation - although other researchers have suggested that print dependency is often an artifact of instruction and/or instructional materials.

Instructional Studies: Rewards. Three of the intervention studies have offered extrinsic rewards to students for improvement in reading comprehension scores (Lovitt and Hansen, 1976; Roberts and Smith, 1980; Swanson, 1981). Lovitt and Hansen (1976) found that allowing students to skip portions of the basal whenever criterion scores were exceeded and drilling when they were not, increased comprehension scores. In the Roberts and Smith (1980) study, eight learning disabled boys read five minutes daily to an instructor in three phases of instruction. In the first phase, students were told to read as fast as they could and not skip any words. The objective, it was explained, was to read more words correctly. In the second phase, students were told to slow down and concentrate on reading each word correctly. They were encouraged to go back to correct errors. In the third phase, the students were told that the objective was to answer the comprehension questions correctly and to do so would require reading all the words. Points and prizes were awarded as incentives in all three phases. The results suggested "when specifically targeted for change, the target behavior (correct rate, error rate or comprehension) improved" (p.64). Swanson (1981) reported that giving one-half minute of free time for every comprehension question answered correctly likewise improved scores.

Instructional Studies: Strategies. Idol-Maestras, 1983;

Lindsey, 1980; Pascarella, Pflaum, Bryan, and Pearl, 1983; Pflaum, Pascarella, Auer, Augustyn, and Boswick, 1982; Sachs, 1983; and Sindelar, 1982 focused their research on the instructional strategies. Idol-Maestras (1983), for example, used a "teacher-guided probing technique prior to story reading" (p.4). As described by the researcher, this strategy

> included guessing general story content from the story title, scanning the material for clues to general context as well as for difficult and/or important words, determining the setting and deciding whether the story was fact or fiction (p.6).

The teacher was responsible for implementing each of the six steps of the comprehension probe. Idol-Maestras found that students' comprehension scores improved during the instructional treatment, but deteriorated after treatment was discontinued.

Lindsey (1980) varied the purpose for reading and found that students who were told to read for specific goals had higher comprehension scores than those who were simply told to read to learn all they could.

Pascarella et.al. (1983) tested students to determine whether they were low or high in internal attribution for effort - that is, whether they saw themselves or others as responsible for their learning successes and failures. The researchers then established two treatment conditions: teacher determination of error and student determination of error. Both groups received instruction "on error awareness and determination of error seriousness for using sentence meaning to decode" (p. 292). In the teacher determination of error treatment, teachers were told to "clearly state to a student whether his or her response was correct and what a correct response was if incorrect" (p. 290). In the student determination of error condition, "teachers were directed to encourage students to find out for themselves when they identified errors as serious and when they made good guesses while learning to self-correct" (p.290). The researchers concluded that students who felt that the responsibity for their learning resided with someone other than themselves benefited more from the teacher determination of error condition and that, conversely, those who saw themselves as responsible for their own learning benefited more from the student determination of error treatment.

Pflaum et.al. (1982) studied the effects of four comprehension facilitating conditions on learning disabled and normal elementary students. The four conditions were word identification and meaning aids, sentence aids, purpose-setting aids and prior knowledge aids. They reported that sentence aids were most effective for learning disabled and similarly achieving, but younger readers. The authors suggest that

> perhaps the most important result ...is the finding that LD students responded no differently to the comprehension aids than did younger, nondisabled children reading at the same proficiency level...(and note that) it may be that children acquire greater flexibility and ability to respond to textual and beyond the text information as they advance into reading proficiency levels beyond the primary grades. (212)

Sachs (1983) provided three types of instruction. In the first group, students completed worksheets and discussed their answers with the teacher; in the second group, a modified Directed Reading Activity was used, students discussed the text and made predictions about what would happen next. The third group generated examples which did and did not illustrate the central concept of the story. Concepts were defined by using examples and non-examples. Sachs found that the literal, inferential, evaluative and appreciative comprehension of the students was better in the latter two treatments than in the worksheet condition.

Sindelar (1982) considered the person(s) doing the instructing as well as the strategy being taught. He devised four groups, three of which were peer tutored. The peers taught either an oral reading, a word recognition or a hypothesis test strategy. The teacher taught the hypothesis test method. The hypothesis test method was based on the strategy used by Samuels 1974 (reviewed in this paper in the section "Reading comprehension research with the Mildly Mentally Handicapped"). Sindelar's research reports that the hypothesis test method was the most effective and that students in the hypothesis test treatments did just as well with peer-tutors as did they did with teacher instruction.

SYNTHESIS OF FINDINGS

Synthesizing across the studies we find that comprehension can be improved by

1) Accessing and, as necessary, developing schemata. This includes schemata for the content, the task, and the contexts in which the task occurs as well as for the type and structure of the text. Defined as such, shemata includes strategies. Many of the activities that develop schemata are those that have as one of their objectives getting the student actively involved. (See Bos and Filip, 1984; Bos and Tierney, 1984; Clark et.al., 1984; Lindsey, 1980; Peleg and Moore, 1982; Sachs, 1983; Schumaker et.al., 1982; Stockdale and Crump, 1981; and Wong and Jones, 1982)

2) Using all the clues available in the linguistic, social and cultural context. (See McGill-Franzen and Gormley, 1980; Robbins, 1983; Samuels et.al., 1974; and Stockdale and Crump, 1981)

3) Developing flexible strategies that can be applied in a variety of situations. (See Clark et.al., 1984; Samuels, 1974; Schumaker, 1982 and Wong and Jones, 1982)

IMPLICATIONS FOR INSTRUCTION

There seem to be four major implications for those concerned with effective reading comprehension instruction for special education students. The first is that instruction and instructional programs need to incorporate the insights about schemata, contexts and strategy development.

The second is that assumptions now held need to be re-examined. Many of the research results (Bos and Filip, 1984; Schumaker et.al., 1981; Taylor and Williams, 1983; Wong and Jones, 1982) suggest that students labeled learning disabled may be as cognitively capable as their non-labeled peers, that is, in terms of academic tasks, they may be learning inefficient rather than learning deficient. The Bos and Tierney (1984) study suggests that students labeled Mildly Mentally Handicapped may be as capable of drawing inferences as their non non-labeled peers.

The third implication is that teachers should become researchers in their own classrooms. The research has suggested strategies that work for some students in some conditions; teachers need to try out under real classroom conditions, strategies that have appeared to be successful under research conditions. This call for teachers to become researchers is one of the strongest needs that has emerged from our research. Only as teachers become researchers can the goal of providing effective reading instruction for every student be realized. (For further explication, see Chapter 9 - Teachers as Explorers: Teacher Researchers and Present Research Needs)

The fourth implication is that strategies found successful with both the handicapped and the non-handicapped should be utilized with handicapped learners. The strategies that have been tried and found apparently successful for students with handicapping conditions are some of the same strategies that have been found successful with their non-handicapped peers. (NB: The only exception is Harber 1983. Her results: that illustrations had a detrimental effect on the reading scores of learning disabled students in the middle and high groups, is in direct contradiction to the research on the effects of illustrations on the comprehension of non-labeled students. That research suggests that illustrations which support the text (that is, provide complementary rather than conflicting information) enhance the students comprehension. As the Harber (1983) finding has generated much controversy, teachers are advised to withhold judgement until they have had the opportunity to research this issue in their own classrooms or until others have done so.)

It seems possible that what is effective for one population may also be effective for the other. Chapters Six and Eight explicitly outline some the the strategies found successful with non-handicapped learners: Chapter Six focuses on thinking strategies and Chapter Eight on strategies used in exemplary studies. The chart that follows summarizes the findings of the special education reading comprehension research.

Table 1

Findings: Special Education Reading Comprehension Instructional Strategies

I. POSSIBLY HELPFUL:

Advanced organizers (developing and accessing schemata): Peleg and Moore (1982), p.3
Context: Mc-Gill-Franzen and Gormley (1980), Robbins (1983), p.5
Continuous instruction (summer school): Cornelius and Semel, (1982), p.12
Cuing: Bos and Filip (1984) , p.7

DRA/CAA: Sachs (1983), p.14
Hypothesis-test (contextual clues): Samuels et.al. (1974), p.3
Individualized instruction (resource room/self-contained): Cox and Wilson (1981), p.12
Modified holistic program: Stockdale and Crump (1981), p.12
Multipass: Schumaker et.al. (1982), p.8
Peer tutoring: Sindelar (1982), p.14
Pre-reading strategies: Idol-Maestras (1983), p.14
Purpose setting: Lindsey (1980), p.14
Rewards: Lovitt and Hansen (1976), Roberts and Smith (1980) and Swanson (1981), p.14
Self-questioning: Wong and Jones (1982), p.8
Silent reading: Leinhardt et.al. (1981), p.11
Visual imagery and self-questioning: Clark et.al. (1984), p.8

II. AMBIGUOUS:

Anagrams: White, Pascarella and Pflaum (1981), p.11
Auditory and visual training: Cook and Welch, p.13
Illustrations: Harber (1983), p.6
Listening/reading: Wiseman et.al. (1980), p.13
Ocular training: Punnett and Steinhower (1984), p. 13
Oral/silent reading: Dubey and O'Leary (1975), p.13
Slingerland/Sullivan: Lovitt and DeMier (1984), p.12
Student/teacher determination of error: Pascarella et. al. (1983), p.14
Vocabulary: Pany, Jenkins and Schreck (1982), p.10

IMPLICATIONS FOR RESEARCH

General Implications. The obvious and general implication is that more research is needed. As has been mentioned, there simply is very little research that has been conducted with students labeled as handicapped. In addition, the research that has been done is often in discrete areas; there is, for example, only one advance organizer study. Hypotheses that have been generated by the existing research need to be confirmed or denied by additional studies.

Generated Issues. In addition to this general need for more research, there is a need for research that addresses some of the questions raised by the existing studies. The questions and the studies that generated them are as follows:

1) Do handicapped students have the same cognitive capabilities as non-handicapped students?

The Bos and Filip (1984) study concludes that students labeled learning disabled are able to utilize effective strategies when externally cued to do so. The results of the reward studies (Lovitt and Hansen, 1976; Roberts and Smith, 1980 and Swanson, 1981) suggest that, given external reinforcement, this same population of students successfully complete academic tasks. If this is so, and it is assumed that all behavior is rule governed, what are the rule systems learning disabled students employ in their approach to academic tasks?

The Bos and Tierney (1984) study suggests that students labeled MiMH are as capable of generating inferences are as non-handicapped peers. If this is so, what are the implications in terms of further research and in terms of instruction?
2) Are there differences - cognitive or otherwise - between students who are labeled poor readers and those who are labeled learning disabled? If so, what are those differences? If not, what are the implications for instruction?

Pflaum et.al. (1982) investigated the effectiveness of four comprehension strategies and found no differences between students when they were matched on reading level.

Taylor and Williams (1983) matched students on I.Q. and reading vocabulary and found that both groups of learners (learning disabled and normally achieving) were equally proficient at identifying text inconsistencies.

3) How much of what is perceived as innate differences in processing strategies is an artifact of instruction (methods and/or materials)?

In the Bos and Tierney (1984) study, it was implied that the students labeled Mildly Mentally Handicapped had less opportunity to develop schema for expository text. How much expository text is read in special education classrooms and how does that compare with mainstreamed classrooms?

Dowdy, Crump, and Welch (1982) suggested that students labeled learning disabled were overly dependent on print. How much special education instruction is meaning based rather than phonetically based? Do the materials used in special education classroom focus on small meaningless parts of speech and short excerpts or whole, longer meaningful texts? Is this ratio similiar in regular classrooms?

Kavale (1980) found that learning disabled students sometimes did not report a strategy and when they did, it was often one that led to incorrect answers. How much opportunity and support do learning disabled students have to experiment with and to develop a variety of learning strategies compared to the opportunities that students receiving non-handicapped instruction have?

4) What is the effect of giving students more opportunities to read silently in the classroom? Is it true that learners learn to read by reading? If so, what are the implications in terms of reading methodology?

Leinhardt et.al. (1981) found that silent reading increased reading comprehension test scores. For every minute of daily additional reading time, post test performance improved one point.

5) Is it true that task-specific, teacher-centered strategies have little long term effectiveness? Is the opposite true- that generalizable, student-centered activities, where students have the opportunity to take ownership of the task, are more effective in the long term?

Idol-Maestras (1983) used a teacher guided probing technique; comprehension scores deteriorated after treatment was discontinued.

Clark et.al. (1984) taught the students a visual imagery strategy that could be used with content area materials. The students' scores improved not only on the measurement designed by the researchers, but on content area tests as well.

Schumaker et.al. (1982) taught a version of SQ3R which students were able to apply effectively to content area materials. Scores on content area tests continued to improve after treatment was terminated.

CONCLUSIONS

If what we have after 15 months of research, and what you have after more than twenty pages of reading, is an additional set of questions rather than answers to our original questions - Was this experience worthwhile? Our resounding answer is "Yes!". Through this experience, we, as researchers, have come to understand what it is we do not know. We have learned what questions to ask. We can only hope that you, the readers of this text, will join us in searching for the answers. Our motivation is fairly straight forward - there are a lot of students whose lives will be better when we have the answers. This landscape has been uncharted long enough.

Chapter 6

A NEW LENS FOR THE LEARNING DISABLED:
A COGNITIVE APPROACH TO READING

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INTRODUCTION

In the summer of 1984, as we discussed the content of our proposed synthesis papers, we wondered what the classroom teacher would want to know about the current "state-of-affairs" in comprehension research. We decided to survey both special education and general education teachers, in various parts of the country, to find out firsthand what they would like to know from the research we were reading.

Some of the replies from our query were: "How can I get my kids to read and understand better?" "What study skills are most useful?" "What can I do to help the 'different' kids - those students who are not succeeding?"

With those questions in mind, I began to look for trends in research that would have implications for the teacher in the classroom, particularly the teacher in special education. In addition, I gleaned instructional techniques from both reading and special educaton journals which could provide a new lens from which we could view instructional practices.

My first objective in this paper is to review the contributions from cognitive psychology in describing how children "come to know" and to discuss two intervention models, one developed by researchers at the Center for Reading, University of Illinois, and the other by researchers at the Kansas Insititute for Research in Learning Disabilities. The first intervention system is a social interaction model which focuses on "self-regulation" training; the second, a "teacher-generated" intervention model in which the student learns a "set of procedures" to learn content material.

My other purpose is to share with you a range of instructional strategies which has, as its theoretical foundation, findings from cognitive and developmental psychology as well as from the field of reading and learning disabilities. This is a "starter" set of strategies for those teachers interested in taking a cognitive approach to reading instruction in their classrooms. I refer to some of these as "comprehension-monitoring" strategies and others of these as "schema-building" strategies.

I will address these purposes in three sections. In the first section, I will review the contributions of cognitive and developmental pschology to the field of learning disabilities. Specifically, I will present the learning strategy model proposed by Brown (1982) and discuss the influence of Vygotsky's work in the development of Brown's intervention model. In the second section, I will review the implications of this work for curriculum by reviewing Brown's instructional model as well as the model developed by Deshler and his associates (1984) at the University of Kansas. In a third section, I will present a series of instructional strategies. These instructional strategies evolve from the literature and are my attempt to give teachers the kinds of practical help that our survey indicated they were seeking.

An Overview of the Issues

Metacognition, or knowledge of one's own cognitive system, has become the focus of reseach on children identified as learning disabled (Hall, 1980; Loper, 1980; Torgesen, 1977; Wong, 1979). Hagen, Barclay & Newman (1982) suggest that a significant reason for this trend is that metacognition is considered a possible explanatory construct for why so many children experience difficulties in certain academic settings. The interest in this perspective has been heightened because, if learning disabled children can be described as "different" in certain metacognitive aspects of problem-solving, then possibly these differences can be remediated through instruction in metacognitive techniques.

The recent interest in the cognitive processing behaviors of learning disabled students emerged as investigators attempted to explain why these students seemed to respond differently from normally achieving students in the academic setting. Traditionally, learning disabled children's academic problems and poor performance in experimental tasks were explained in terms of specific ability deficits (Cruickshank & Hallahan, 1975a, 1975b; Torgensen, 1975). That is, these children experienced an inability to function effectively in the areas of visual and/or auditory perception, visual and/or auditory memory, motor abilities, language, and so forth. However, as researchers were successful in changing performance of task through brief instruction or prompts, a "production deficiency in appropriate strategies rather than a specific deficit appeared to best explain the performance difference of these inactive learners" (Wong, 1982b). These insights initiated a changing perspective of disabled learners which seemed to be a more functional view, suggesting that:

> ...these students had knowledge that they had failed to access under certain circumstances, or had strategies they had failed to use, or they had failed to learn under what circumstances certain strategies were useful because they helped to monitor one's progress (Wong, 1982b).

Brown & Campione (1981) refer to this perspective as "diagnosis of restricted access." This new direction, examining the cognitive processes and the nature of participation of the learning disabled child in the academic setting, has dominated the learning disability literature in recent years.

In response to the suggestion that learning disabled children seemed to exhibit an inability to adapt to various learning situations, recent investigations have pursued this notion. Several researchers, (McKinney & Feagans, 1981; McLeskey & Cummings 1982; Palinscar & Brown, 1983) have outlined various cognitive behaviors of learning disabled children and have concluded that "further study of LD as a problem-solving deficit is needed to provide insights into the instructional practices necessary for teaching the problem solving process" (McLeskey & Cummings, 1983, p. 20). They concurred, however, that learning disabled students often fail to adapt an active, planful, and organized approach to learning tasks.

While research conducted recently provides convincing evidence that learning disabled children as a group do not spontaneously engage in certain organized goal-directed strategies that aid performance on intellectual tasks, training studies indicate that they can employ these strategies if taught to do so (Wong, 1978, 1980). These findings suggest that more participation can be generated through an interactive curriculum by teaching a system of strategies which demonstrate patterns of organization to this population.

Theories of information processing from developmental and cognitive psychology have provided a powerful impetus for research investigating the cognitive processing of students labeled learning disabled. In the next section the psychological underpinnings of these projects will be discussed.

CONTRIBUTIONS FROM COGNITIVE PSYCHOLOGY

The work of the cognitive psychologists in the late sixties and throughout the seventies led to a fairly detailed description of how children acquire academic skills and come to know how to learn (see Brown [1977, 1979] and Bransford [1979] for a more detailed account of this process). An overview of the learning model that has been adapted by Brown (1982) from Bransford (1979) and Jenkins (1979) is reproduced to illustrate their views concerning the nature of the cognitive process (see Figure 1).

The diagram is intended to represent the learning situation, that is, the learner in context. According to Brown, there are four factors that comprise the learner-in-context, and these factors interact in many combinations. The four factors are:

(1) certain characteristics of the learner including his/her capacity and state of prior knowledge;

(2) the nature of the materials to be learned;

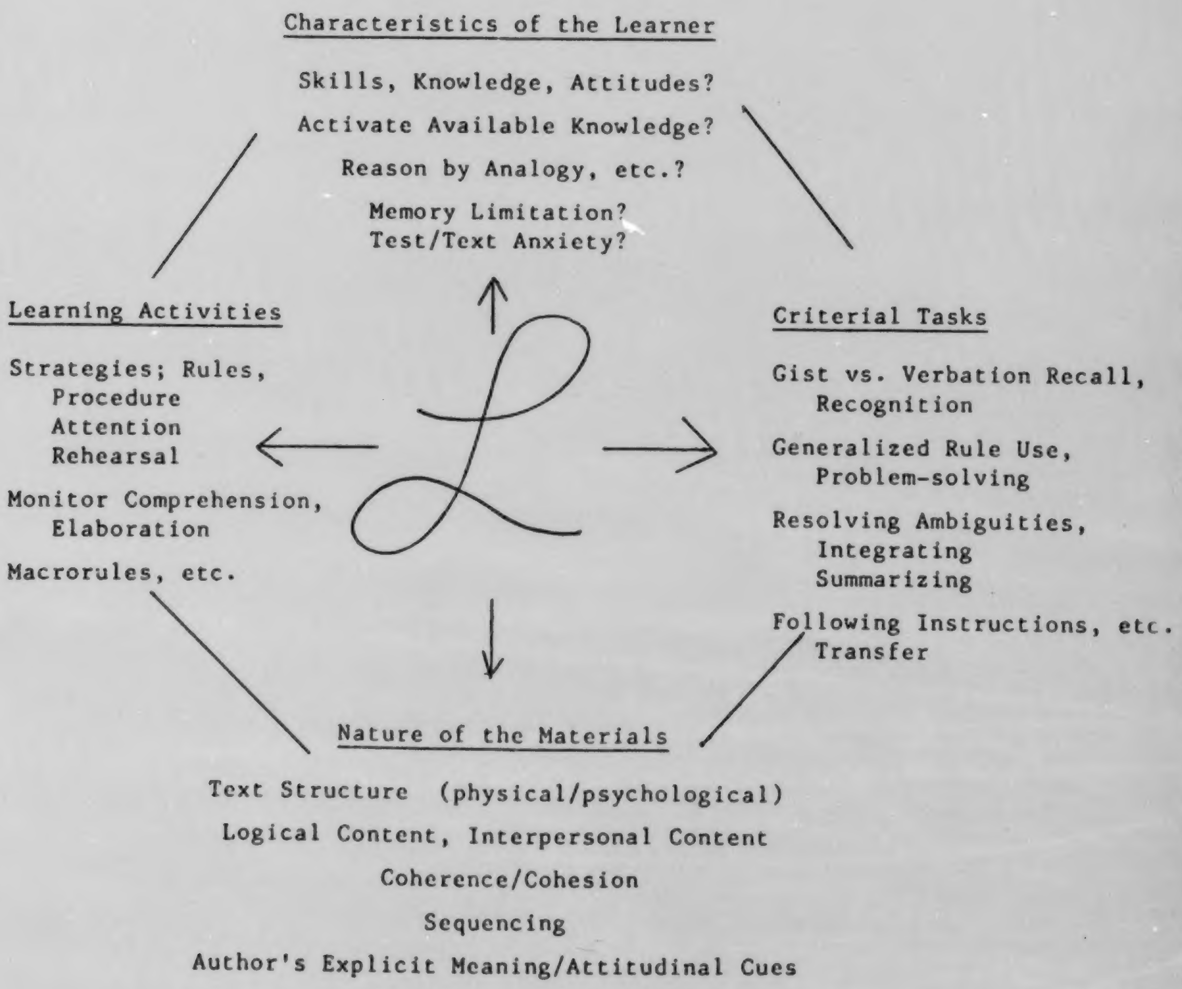
(3) the critical task, that is, what end product is required for the learner; and

(4) the learner's activity.

The model attempts to capture the notion that learners vary in what they know and what they can do and these factors influence how they learn.

Figure 1

A Simple Learning Model: An Organizational Framework
For
Exploring Questions About Learning From Texts
(Adapted from Jenkins, 1979, Bransford, 1979)



Characteristics of the Learner

Skills, Knowledge, Attitudes?
Activate Available Knowledge?
Reason by Analogy, etc.?
Memory Limitation?
Test/Text Anxiety?

Learning Activities

Strategies; Rules,
  Procedure
  Attention
  Rehearsal
Monitor Comprehension,
  Elaboration
Macrorules, etc.

Criterial Tasks

Gist vs. Verbation Recall,
  Recognition
Generalized Rule Use,
  Problem-solving
Resolving Ambiguities,
  Integrating
  Summarizing
Following Instructions, etc.
  Transfer

Nature of the Materials

Text Structure (physical/psychological)
Logical Content, Interpersonal Content
Coherence/Cohesion
Sequencing
Author's Explicit Meaning/Attitudinal Cues

The Learner-in-Context Notion

Brown's organizational framework for exploring questions about learning supported her earlier thesis (1979) that the developing child should be seen as a whole person, since learning involves and combines many areas of personality development previously perceived as separate such as fear of failure, need for achievement, external versus internal control, learned helplessness, and level of aspiration. She placed the learner interacting in the center of the tetahedral with the elements of the learning environment with different degrees of emphasis, depending on the learning situation.

A broader view of the learner-in-context notion which included the whole environment as well as the whole person was proposed by Neisser (1976a, 1976b). He argued that:

> ...there were three aspects to cognitive processing. First, human thought undergoes cognitive development. It has a complex ontogenetic history, in which maturation, learning, and changing opportunities for experience, all play a part. Second, human thinking is passionate, emotional, influenced by internal states that have both long and short-run dynamics of their own. Finally, human beings have many motives simultaneously. They may play chess to bolster their egos, for aesthetic pleasure, to maintain a personal relationship, and to symbolize unconscious wishes all at once. All three of these qualities arise because people develop and use their cognitive skills in a real environment: they are always in concrete situations with multiple opportunities (p. 140).

Neisser's inclusion of "complex ontogenetic history," emotions and feelings, multiple motives, changing duration of dynamic states in the cognitive process, and cognitive skills being developed in a real environment moved the reasoning process beyond the academic environment to include the child's culture. This encompassing view of cognitive processing provided a broader interpretation to the "state of prior knowledge" than was suggested in Brown's model of learning adapted in 1982. However, her recent research (Baker & Brown, 1984) indicated that she, too, views the learner's prior knowledge to include experiences other than those related to academic prior knowledge.

The emphasis on the active role of the information processor leads to the idea that learners actively construct meanings from their texts and from their environment, and more importantly, that learners are responsible for their own learning (Reid & Hresko, 1981). This learning process involves a set of procedures and learning activities such as attention and recognition, rehearsal and recall, elaboration and problem-solving. These aspects of the learning process are incorporated in Brown's learning model under the categories of criterial tasks and learning activities. Using the current terminology in the literature today, these components are referred to as metacognition.

Understanding Cognitive Development

Knowledge in general is seen both as a product or integrated collection of factual information and a process or set of procedures for knowing. This concept is referred to in the literature as metacognition. Flavell (1976), who has been influential in the current research in this area, defined metacognition as "knowledge that takes as its object or regulates any aspect of any cognitive endeavor" (P. 4). Metacognition involves two components: (1) an awareness of what skills, strategies, and resources are needed to perform a task effectively, and (2) the ability to use self-regulatory mechanisms during an ongoing attempt to learn or solve problems. These activities include planning one's moves, evaluating the effectiveness of one's ongoing activities, checking the outcome of one's efforts, and revising strategies when necessary (Baker, 1982; Baker & Brown, 1984; Brown, 1980; Brown & Campione, 1979).

A reoccurring theme that is pursued in the learning disability literature explores the differences in problem solving strategies of normally-achieving students and those students labled LD. Learning disabled students are seen as less active in invoking activity such as rehearsal because they are less intrinsically motivated to perform well or to expend effort on various tasks both in and out of school (Henker, Whalen & Hinshaw, 1980; Wong, 1980). Torgesen (1977) noted that learning disabled children seem to lack an ability or an inclination to develop and use efficient strategies. He suggested that "both the cognitive and emotional characteristics necessary to adapt to the requirements of a task and to use active and efficient task strategies" may be lacking in the LD child. This change of lens provided a new focus in the recent directions of research conducted in the area of metacognition.

Baker & Brown (1984) noticed this changing of lens and have observed that researchers have moved from examining "how, when and where students have difficulty studying to an emphasis on interventions designed to overcome problems" (p. 380). The authors suggest there are three aspects to the current reseach on metacognition: (1) the attention to the metacognitive environment in which the skills are trained; (2) adequate diagnosis of the learner's needs; and, (3) training in the context of reading with the goal of understanding and remembering (p. 381).

Citing their own research as evidence, Baker and Brown argue that successful cognitive skills training must include three components: (1) skills training; (2) self-regulation training; and (3) awareness training. They propose that diagnosis is an important ingredient which provides for interaction between the teacher and student and they have developed much of their recent research on Vygotsky's theories of self-regulation.

The component of self-regulation and diagnosis reflected Vygotsky's views on guided learning within the student's "zone of proximal development" (Vygotsky, 1978) which addresses the student's learning process. Vygotsky's (1978, p. 86) definition of the zone of proximal development is "the distance between the actual development level as determined by individual problem-solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers." Vygotsky argues that all psychological processes are initially social, shared between people, particularly between child and adult, and the the basic interpersonal nature of thought is transformed through experience to an intrapersonal process. Vygotsky wrote:

> We propose that an essential feature of learning is that it creates the zone of proximal development; that is, learning awakens a variety of developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with his peers. Once these processes are internalized, they become part of the child's independent development achievement. (Vygotsky, 1978, P. 90)

Vygotsky saw social interactions among teachers and students as well as instruction in formal school disciplines as central to children's acquisition of knowledge and self-regulatory skills. According to Vygotsky, as students acquire new knowledge, they also acquire routines for regulating and controlling their use of that knowledge. Self-regulation occurs only after students perceive the significance of structural relations among concepts and only after teachers have verbally mediated and guided students' use of concepts for extended periods of time. From these mediated learning experiences, students eventually acquire language for regulating their own learning, and they do so by reconstructing in their own minds the speech or language forms teachers use to teach them (Wertsch, 1979; Vygotsky 1979).

A major form of cognitive development is, then, the gradual internalization of regulatory skills first experienced by the child in social settings (Vygotsky, 1978). Through repeated experience with experts who support, evaluate and extend the limits of experience, children develop skills of self-regulation.

Baker & Brown (1984) have seen a trend in current research from experimenter-controlled, or teacher-controlled, instruction of the traditional kind towards a concentration on interactive processes. "It is through interaction with a supportive, knowledgeable adult that the student is led to the limits of his/her own understanding. The teacher does not tell the student what to do and then leave the child to work on unaided; she enters the interaction where the child and teacher are mutually responsible for getting the task done. As the child adopts more of the essential skills initially undertaken by the adult, the adult relinquishes control" (p. 382). Examples of teacher-student interactions using Vygotsky's theory of "guided learning" will be given in the curriculum section of this paper.

Instructional Implications

While developments in cognitive psychology have had an impact on reseach concerned with the learning process and learning disabilities it has also been a factor in the area of reading comprehension. Pearson (1982) summarized the cognitive oriented research of the 1970s with its implications for reading comprehension and noted two major conclusions. The most basic conclusion, according to Pearson, is that reading is a complex interactive process

(Rumelhart, 1977; Stanovich, 1980):

> ...one in which a reader varies his focus along a continuum from primarily text-based processing (concentration on getting the author's message straight) to primarily reader-based processing (concentration on predicting what the author's message will likely be)...(p. 81).

He explains that this variation in focus is determined by a number of factors: reader purpose, interest and motivation, and discourse type and complexity. The second conclusion drawn from this research is that both content and process factors are implicated in reading comprehension. Content factors are the knowledge structures residing in our long-term semantic memory that determine how well we understand and integrate a particular text. That is, the more we know about a topic addressed in the text, the greater the likelihood we will understand, integrate and remember the information contained in the text. Another type of content that influences comprehension is knowledge about text structure or text genre in which the topical knowledge is embedded. The work on story structures (Neilsen, 1977; Stein & Glenn, 1979; Thorndyke, 1977) and typical rhetorical structures found in expository writing (Meyer, 1977; Meyer, Brandt & Bluth, 1980) indicates that familiarity with structure influences comprehension.

Harste, Burke and Woodward (1981) have provided a wider lens on the reading and writing processes suggesting that learning is a socio-psycholinguistic event in which the learner uses all of his/her knowledge about the world (schemata), knowledge about culture, knowledge about language, and knowledge about the context of situation to make sense of the environment and in the development of literacy. Rather than viewing the reading process as interactive, they incorporate the notion of reading as a transaction (Rosenblatt, 1979) in which the reader creates a "new event" in each encounter with the text.

Goodman (1982) underscores the need to include the affective domain when working with "readers in trouble." He has proposed that the key to helping readers in trouble is to help them revalue themselves as language users and language learners, and revalue the reading process as an interactive, constructive language process. He feels that these students must set aside the pathological view of themselves, cast off the labels, and operate to construct meaning through written language using the strengths they have built and used in making sense of oral language or sign. Goodman views reading as a psycholinguistic process in which thought and language interact as the reader builds meaning.

Evidence from research in cognitive psychology and reading have direct implications for instruction in the classroom. In the following section, intervention programs found to be effective in the research paradigm will be generalized to the classroom.

CURRICULAR IMPLICATIONS

An important corollary to the identification of learning disabled students is the development of instruction which facilitates their learning. The evidence generated from research in reading, cognitive psychology and the field of learning disabilities is that the learner must be actively involved in the learning process and that instruction must be meaningful. Much of the evidence from current research support the notion of "restricted access" to acquired knowledge (Brown & Campione, 1981) and investigators have used strategies which have proved effective in helping learning disabled students monitor and evaluate their learning.

In the field of learning disabilities, two approaches in the development of intervention models have been pursued. In both intervention systems, the students were taught how to learn rather then concentrating on content information. In each situation training incorporated academic tasks in an academic setting. One of these studies has been in progress several years at the University of Kansas Institute for Research in Learning Disabilities (Deshler, et. al.,1981; Schumaker, et. al., 1983). The major mission of this team has been the development of an intervention curriculum that was powerful enough to affect the performance of learning disabled students in school settings. These researchers developed a curriculum comprised of strategy training, social skills, modified materials, and instructional procedures. They reported the ultimate goal of this group was to develop an intervention program so that most responsibility for learning was placed on the students (Schumaker et al., 1983). This approach was designed to teach students "how to learn" rather than teach students specific content.

Deshler and his associates reported that the core component of the intervention model utilized the learning strategy approach. Learning strategies as defined by Alley & Deshler (1979), are "techniques, principles, or rules that will facilitate the acquisition, manipulation, integration, storage, and retrieval of information across situations or settings." For example, under a learning strategies approach, the instructional goal is to teach students techniques for organizing materials that has to be memorized for history tests rather than teaching them actual history content. Thus, while learning to use organizational strategies to improve comprehension and retention of history concepts, students also learn a skill that theoretically will facilitate acquisition of information in other subject areas. An ultimate goal of learning strategy instruction is to enable LD individuals successfully to analyze and solve novel problems that they encounter in both academic and nonacademic environments (Schumaker, et. al., 1983, p. 49).

In an effort to help the LD adolescent deal with the large volume of materials, the research team modified the way in which classroom content was delivered to the LD student. Instructional procedures and materials were modified with the goal of altering not the content, but rather the format and mode of presentation of the content. They developed two procedures:

1. techniques for transferring text book chapters onto audiotapes and teaching LD students a comprehension and organizational strategy for learning the taped information were developed (Schumaker,

Deshler & Denton, 1982).

2. an advanced organizer technique that can be used by content teachers before presenting the classroom lecture was designed (Lenz, 1982).

The modification of materials involved paraprofessionals taping the main ideas and important facts using a study guide, chapter texts, and so forth. After the entire chapter had been taped, the students were taught how to survey, obtain detailed information and test themselves. For students whose reading levels were more than four years below their grade levels, an alternate version of the Multipass strategy (see the attached Compendium for more complete details) was developed. This strategy, called S.O.S., included the same three passes over the textbook chapter as specified for Multipass, while simultaneously using a visually marked version and an audiotaped version of the chapter. During the application of the S.O.S. strategy, the student completed an organized outline. The authors reported that these strategies were designed to make the student active in the learning process (Schumaker, et. al., 1983).

Alley and his associates (1983) noted that most LD students were able to apply the strategies to material at their reading level as well as material written at their grade level and receive comprehension scores comparable to those obtained over the easier readings. They reported that the small number of students who were unable to generalize to the more difficult material exhibited a gap of six or more years between reading level and grade level.

The advanced organizers procedure involved a brief training procedure in which content teachers were taught how to use advanced organizers in the classes. The components of an advanced organizer taught to teachers were (1) informing the students about the advanced organizer, (2) identifying topics or tasks, (3) providing an organizational framework for the class period, (4) clarifying actions to be taken, (5) providing background information, (6) stating the concepts to be learned, (7) classifying the concepts to be learned, (8) motivating the students to learn, (9) introducing voacabulary, and (10) stating the general outcome desired (Schumaker, et. al., 1983, p. 58).

At first glance, these procedures may appear to help the learning disabled student become more active in the learning process. However, the effect of modifying the text content and the retraining of teacher's mode of presentation resulted in the placement of responsibility for learning upon the teacher rather than the student. The researchers stated that the goal of this procedure was to involve the learner as a more active participant in the learning process but, in reality, the modification of text materials could actually enhance the belief of many LD students that something must be changed in the setting in order for them to learn. The result is the students have no vested interest in the learning process. Reid and Hresko (1981) have expressed similar concerns, noting that when it is the LD teacher who assumes responsibility for designing strategies taught to students, the students have missed the opportunity to analyze setting demands or to design their own task specific strategy.

These concerns seem to be addressed in the studies conducted at the Center for Reading at the University of Illinois. According to Brown and her associates (Brown, 1980; Baker & Brown, 1984; Palincsar & Brown, 1983), a more extensive, ecologically valid research design capitalizes on the social interaction between teacher and student as well as teaches comprehension-monitoring strategies. Brown & Campione (1979) have been critical of studies which have not incorporated the social interactive nature of learning and have not provided for the gradual internalization of executive control by the learner. They feel that:

> ...the student who is typically told to check, monitor or self test by an experimenter who invents the program _for him_ has no chance to take part in a dynamic social interaction where experts (adults or peers) display executive functions in the normal course of problem solving (p. 526).

While there are many similarities between the intervention program at the University of Kansas Institute and the studies designed by Brown and her colleagues, a major difference was the nature of the teacher-student interaction. Two instructional studies directed at "comprehension-fostering" and "comprehension-monitoring" activities of junior high students were reported by Palincsar & Brown (in press). The investigators used the activities of summarizing, questioning, clarifying, and predicting embedded within a training procedure that was very similar to prototypical interactive mother-child, teacher-student dyads, which incorporate Vygotsky's views on learning through interaction with significant others. Termed _reciprocal teaching,_ the procedure consisted of students and teacher taking turns leading a dialogue concerning each segment of text.

The general procedure was that the adult teacher assigned a segment of the passage to be read and either indicated that it was her or his turn to be the teacher or assigned one of the students to teach that segment. The adult teacher and the students then read the assigned segment silently. After reading the text, the teacher (student or adult) for that segment summarized the content, discussed and clarified any difficulties, asked a question about future content. All of these activities were embedded in a dialogue as natural as possible, with the teacher and other students giving feedback to each other.

During the strategy training the dialogue leader did the following:

1. paraphrased the main idea;
2. discussed how pieces of information in the paragraph might be grouped or classified;
3. predicted the possible questions that might be asked about the segment;
4. hypothesized about the content of the remaining passage segments; and
5. commented on any confusions and how they might be resolved.

After the dialogue, the dialogue leader asked the other participant a question concerning that segment. Then the roles were reversed.

The researchers reported that, initially, the students had great difficulty in assuming the role of dialogue leader. The adult teacher was demonstrating effective comprehension monitoring strategies, but the students were relatively passive observers. During the intermediate stage, the students became much more capable of playing their role as dialogue leader and by the end of 20 sessions, were providing paraphrases and questions of some sophistication (Palincsar and Brown, in press).

Upon close inspection of the dialogues, these researchers noted repeated examples of the teachers providing modeling, feedback, and practice to students at exactly the level they needed. As students became better able to perform segments of the task, the teacher increased her or his demands accordingly, until the students' behavior became increasingly like that of the adult model, who in turn decreased her or his level of participation and acted as a supportive audience.

During the course of the study, the students took comprehension tests that were given as part of their regular science and social studies instruction. The trained students began the study with scores below the 20th percentile rank compared with their age peers, but after the study 90 percent of the students showed a clear pattern of improvement, averaging a 36th percentile-rank increase, thus bringing them up to at least the average level for their age mates (cited in Baker & Brown, 1984). The researchers reported that the effect was durable; maintenance probes showed no drop in the level of performance for up to an eight week period (Palincsar & Brown, in press).

While these studies demonstrate a clear pattern of ecological validity which is more prominant in research design than was the case in earlier studies on metacognition, it is clear that both research groups felt it was imperative to teach and demonstrate a set of procedures for students to learn. Short (1985) notes that in the study conducted by Deshler and his assocates (1981) students were expected to take and apply a rule given to them by the researchers rather than to generate their own hypothesis. (See Short's article in this book for a more detailed discussion of higher levels of cognitive processing.) In the case of Brown's research, it appears that students were able to generate their own hypotheses regarding the main ideas of the passage. However, the authors do not specifically address a situation in which a student might generate an hypothesis which may be inconsisent with the content of the passage.

In the following section, I will discuss various instructional procedures which have been reported in reading comprehension and special education literature as well as those reported in research investigations.

Strategy Lessons

As the repertoire of instructional techniques increases, it is evident that research investigators and educators have made significant progress in teaching learning disabled students metacognitive skills. Researchers have moved from examining cognitive processing strategies using problem boards (McKinney & Haskins, 1980), block balancing tasks (Reid & Knight-Arest, 1981), and attribute logic blocks (Lester, 1980) in experimental settings to instructional tasks in academic settings.

There seem to be two approaches when research teams design or plan instruction. In one approach, the emphasis tends to be on getting the meaning from the text, or reconstructing the author's message. The reader is thought to be like a sponge, whose purpose is to absorb all the important facts from the printed page. Strategies developed from this paradigm I have called "teacher-generated" or comprehension-monitoring strategies.

Given the hypothesis that learning disabled students tend to be less active in the learning process and often fail to adapt a planned and organized approach to learning tasks, it is easy to understand why researchers have concentrated on procedures that teach comprehension-monitoring procedures. However, I would like to suggest that there are more aspects involved in the learning process than metacognitive strategies. How the learner views himself, the teacher, as well as the academic setting has important implications for the success or failure in school and cannot be ignored when planning instruction.

An alternative to the above approach is to focus the emphasis for instruction upon the background and needs of the learner. The reader is encouraged to "bridge the gap" between what is known and what has to be learned by generating hypotheses concerning the information in the text. The learner becomes an active participant in the process by predicting, confirming and integrating information. Strategies developed from this paradigm I have called "schema-building" strategies.

To illustrate the differences in instructional focus of these two paradigms, I have listed several strategies in the following Figure 2 under the headings of Comprehension-Monitoring Strategies and Schema-Building Strategies. A complete description of these strategies can be found either in the discussion which follows or in the section entitled A Compemdium of Strategy Lessons to Try in Your Classroom.

Figure 2
Instructional Strategies

Comprehension-Monitoring	Schema-Building
Self-questioning	Text Encounters of the Predicting Mind
Statement-Pie	E.R.R.Q
Multipass (Survey Pass)	ARMS
(Size-Up Pass)	Schema Mapping
(Sort-Out Pass)	Make Your Own Adventure
Structural Overview	Debate
Reciprocal Teaching	Using Context to Develop Meaning

Strategies under the "comprehension-monitoring" heading include the components of skill training, self-regulation training and awareness training in various degrees. I view these procedures as teacher-generated instruction. For example, when using a Structured Overview (Vacca, 1981) the teacher determines the concepts to be learned and provides a graphic organizer for the topic. All these strategies have been designed to help the student learn how to learn by using strategies for reading and remembering; using knowledge of the inherent structure of text (its syntactic, semantic and structural complexity); knowing the extent to which the text's informational content is compatible with existing knowledge; and understanding the purpose of the task.

On the other hand, "schema-building" strategies are "student-centered," with the learner highlighting his/her prior knowledge and generating the key concepts of the texts. The student determines the important points and organizes the relationships between these key concepts points. These behaviors are highlighted in a strategy called Schema Mapping. The student selects the main points from the text rather than the teacher. After the relationships are categorized, a map is drawn illustrating these relationships. As the students shares his/her maps with other members of the groups, not only is it obvious that more than one concept can be highlighted, but an appreciation for other viewpoints can be developed. This strategy allows the student to move beyond the text and, at the same time, encourage flexibility in perspective.

Besides having proven to be successful, these strategies are open-ended; that is, the strategies provide for differences in students and can be adapted for most age groups. Some of the strategies have been developed to help an individual student with a specific need, others have been developed to help groups of students use reading and writing as tools for learning content area concepts. The strategies are not presented in an hierarchial manner, but rather as a collection of suggested methods considered to be effective in teaching students.

The strategies under Schema-Building have been adapted by teachers and graduate students from several universities working with Carolyn Burke, Yetta Goodman, Jerry Harste, and Dorothy Watson, so it is difficult to cite the original source of the strategy. Versions of these strategies, however, can be found in Goodman and Burke (1980), Busch (1983), and Watson (1985).

I hope I have provided you with a new lens with which to view instruction. Certainly research in reading comprehension has changed direction and is focusing more on cognitive processing behaviors than in the past. In closing, I would like to encourage teachers to move beyond the teacher-generated method of intervention and provide opportunties in their classroom to allow the students to become decision-makers. Both situations are applicable in the learning environment. In some situations, it is appropriate and necessary for the teacher to be the decision-maker. However, it is equally important for the student to have experiences as the decision-maker. How else can the student gain the confidence to take responsibility for his/her learning?

A COMPENDIUM OF INSTRUCTIONAL STRATEGIES TO TRY IN YOUR CLASSROOM

Self-Questioning Strategy (see Wong & Jones, 1982)

Rationale:

Asking questions help readers discover new meanings and adds to general knowledge.

Evaluation: (Who are you teaching?)

Students who are having difficulty focusing on the text, those who have difficulty understanding the text, and those who are not good questioners will benefit from this strategy.

Procedure:

1. The teacher explains that the purpose of this strategy is to help students understand what they read. Students ask themselves, "Why am I studying this passage?" (So I can answer some questions.)
2. Locate the main idea in the paragraph and underline it.
3. Think of a question about the main idea.
4. Learn the answer to the question.
5. Look back at the question and answer for each paragraph to see how each successive question and answer provides more information about the passage.

Variation/Extensions:

The strategy could be a basis for a 10 minute uninterrupted writing. Begin by asking students: "What predictions did you make? Was it similar or different from the authors?"

Statement-PIE (see Hanau, 1974; Englert & Lichter, 1982)

Rationale:

The process of reading and writing requires the application of organizational strategies. To understand or express ideas, writers and readers must formulate a primary topic, then link this topic to the surrounding chunks of information (Meyer, Brandt & Bluth, 1980). In this way, readers and writers seek to establish a single topic, then elaborate upon it with related propositions, proofs, examples, and counterexamples (Hanau, 1979).

Evaluation: (Who are you teaching?)

Students who are having difficulty with organizational skills, those who have difficulty with the processes of learning involving abstraction, analysis and synthesis. This strategy is also helpful to students who have difficulty in differentiating major ideas from less essential PIEces of information.

Procedure:

1. Teachers should inform students that "everything, whether written or spoken, can be broken into two elements: (a) the statement, and (b) the PIE" (Hanau, 1974, p. 27). The statement is the main idea or topic of the passage; it is what the passage is about. The PIE are "all the pieces of the PIE" that lead us to believe the statement. The PIE is an acronym for the author's Proof, Information, and Examples. To demonstrate to the students the relationship of supporting details to their main ideas, several real-world examples should be presented. In each case, teachers sould carefully explain the relationship of PIEs to their related statements (i.e., PIEs are the proof, information, examples).

2. Once several real-world examples have been presented, students should be encouraged to make up their own examples of statement-PIE, given a statement and an incomplete model of the information structure. For example, given the statement, "I like _________," students should supply the related details or PIEs to complete the information structure.

   Statement: I like ______________________________.
   PIE: They ________________________________.
   PIE: They ________________________________.
   PIE: They ________________________________.

3. Present examples from text material. Using several paragraphs, teachers and students should complete a statement-PIE information structure. To aid students in the differentiation of statements, teachers may cue or prompt students with such questions as, "What is this paragraph about?" or "Tell me in one to three words what the topic of the paragraph is." To direct attention to related details, teachers

may ask, "What makes you believe the author?" or "What proof, information, or examples does the the author present that would lead you to believe this statement?"

4. Once the students are able to identify the statement-PIE elements in paragraphs, increase the complexity of examples which show statement-PIE elements in more varied positions.

Variations/Extensions:

1. Children should have the opportunity to experience and respond to text which has been organized in different ways. Five text structures have been described by Meyer, Brandt and Bluth (1980). These textual patterns involve: problem/solution; antecedent/consequence; description comparision; collection. By selecting text examples that typify these patterns, teachers can help students accomodate statement-PIE procedures to the varied organizational styles they will encounter in written material.

2. Use statement-PIE to develop writing ability. Give students a picture and ask them to generate two or three topic statements about the picture. These statement need not be expressed in complete sentences, but must represent the overall impression of the scene. After writing statements, students should write three related PIEs for each statement. PIEs can be written as phrases, sentences, or sentence fragments. These statement-PIEs can serve as an organizational map from which the students can write a cohesive passage.

Multipass (see Deshler, 1981; Schumaker, Deshler, Alley, Warner, 1983; Robinson, 1946)

The Multipass strategy includes three substrategies: Survey, Size-up, and Sort-Out. Each substrategy requires the reader to "pass" through the text. In teaching the substrategies it is most efficient to teach each substrategy separately and then combine them.

Survey Pass

Rationale:

The purpose of the Survey Pass is to become familiar with the main idea and organization of the text, for instance, a chapter in a content area textbook.

Evaluation: (Who are you teaching?)

Students who are having difficulty in reading assignments in their content area will benefit from this strategy.

Procedure:

1. Read the chapter title.
2. Read the introductory paragraph.
3. Review the chapter's relationship to other adjacent chapters by perusing the table of contents.
4. Look at the illustrations and read their captions.
5. Read the summary paragraph.
6. Paraphrase all the information gained in the process.

Size-Up Pass

Rationale:

The second substrategy is designed to aid the student in gaining specific information and facts presented in the text. To direct the student's reading, the questions at the end of the chapter are read first, and questions the student can already answer are checked. The student then proceeds through the chapter utilizing the following steps:

Procedure:

1. Read the headings and subheadings and cue words, e.g. italics, bold-face print.
2. Change the information in the heading or cue into a question.
3. Skim the surrounding text to find the answer.
4. Paraphrase the answer.

At the end of the chapter the student paraphrases all the facts and ideas that can be remembered.

Sort-Out Pass

Rationale:

The third pass engages the student in testing himself on the information presented in the chapter.

Procedure:

The student rereads the questions at the end of the chapter and attempts to answer them from memory. If the student answers the question correctly, a checkmark is placed by the question. If the student is unable to answer a question, the answer is obtained by thinking where the answer is located in the chapter and skimming that section.

Variations/Extensions:

Teachers using Multipass may want to develop their own questions over the text rather than using the questions at the end of the chapter. This ensures that the students are focusing on and studying the information the teacher deems critical (Bos, 1983).

ERRQ -- Estimate, Read, Respond, Question (see Watson, 1985)

Rationale:

Readers who make a commitment to the text and try to link new information to their own background of experience are more likely to generate meaning from text. Questioning serves as a vehicle to discovery.

Evaluation: (Who are you teaching?)

Students who do not personalize their knowledge and students who have difficulty asking and answering questions will benefit from this strategy.

Procedure:

1. Explain to the students that ERRQ stands for Estimate, Read, Respond and Question. Have students select something they want to read, look it over and ESTIMATE how far they can read with understanding. How far can they "stay with" the text? Have them mark that place lightly in pencil or record the page number.

2. Students READ the text. They may read silently, orally, with paired or assisted reading. As they are reading, ask them to think about how the text makes them feel, if any images or words come to mind. Does the text remind them of anything from their own lives?

3. After reading, have the students first REACT to the reading. What came to mind as they read the article? Did images or memories flash in their minds? How did it make them feel to read the article? After they have reacted, have them retell everything they can remember about the article.

4. Have students ask at least two questions about their reading. These questions can be "school-type" (such as "What was the main idea?") or personal questions (How will the book end," "Why was it so sad?").

Variations/Extensions:

1. The form can be modified. Students can do the RESPONSE and QUESTION sections orally or in writing, depending on the size of the group, the age, and the purpose.

2. The student can select materials, or in a content class the teacher can select the materials.

3. The REACTION portion of the RESPONSE can lead naturally into the RETELLING. Many students begin reacting and end up retelling. Usually, the better the reaction, the better the retelling will be. Depending on the quality of the reaction and the teacher's purpose, the retelling need not be done every time.

4. The QUESTIONING portion can be modified. If students have great difficuty asking appropriate questions as they read, the teacher could demonstrate the procedure by sharing questions with them.

Structured Overview (see Vacca, 1983)

Rationale:

When students are asked to read and learn from lengthy texts (whole chapters, units of similar length), their learning will be enhanced if, before they read, they have in mind the structure and the major points of information in the text.

Evaluation: (Who are you teaching?)

Students who are having difficulty with reading assignments in content area classes will benefit from this strategy.

Procedure:

1. Select words and concepts from the reading selection which are important for student's increased understanding.

2. Organize these words and concepts in a diagram which shows the relationship among these ideas (see following page for an example).

3. Before reading the chapter or unit, draw the diagram on the chalkboard. Discuss the arrangement of the concepts and their relationships.

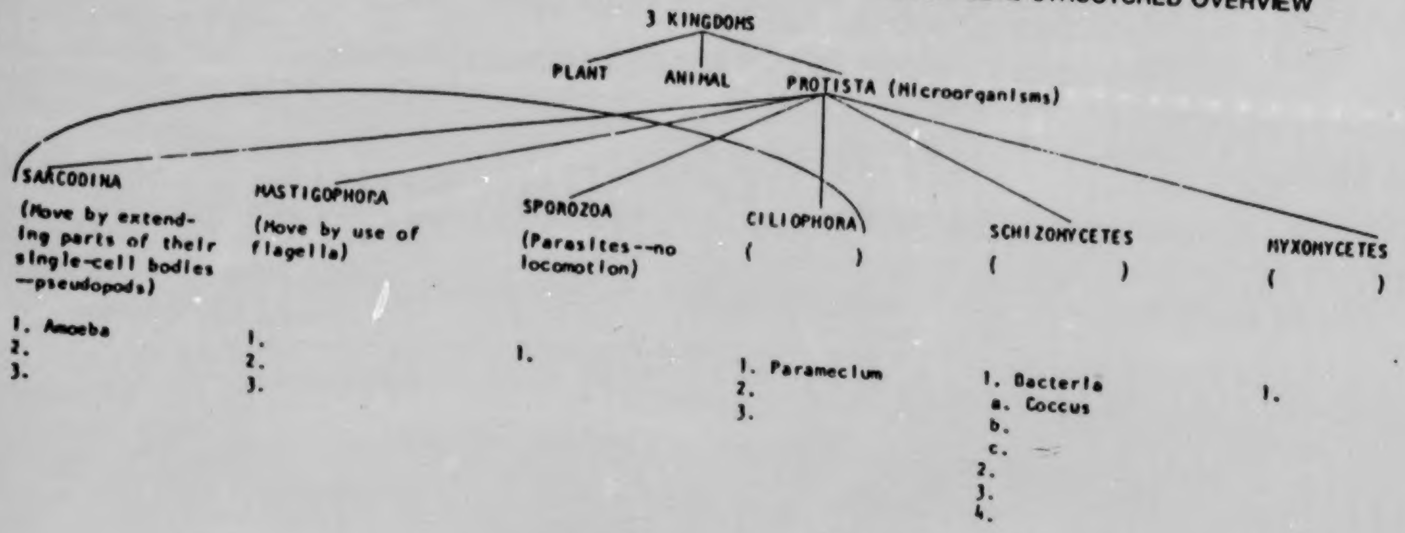
4. Encourage students to refer to the structured overview when it is appropriate throughout the reading of the chapter.

Variations/Extensions:

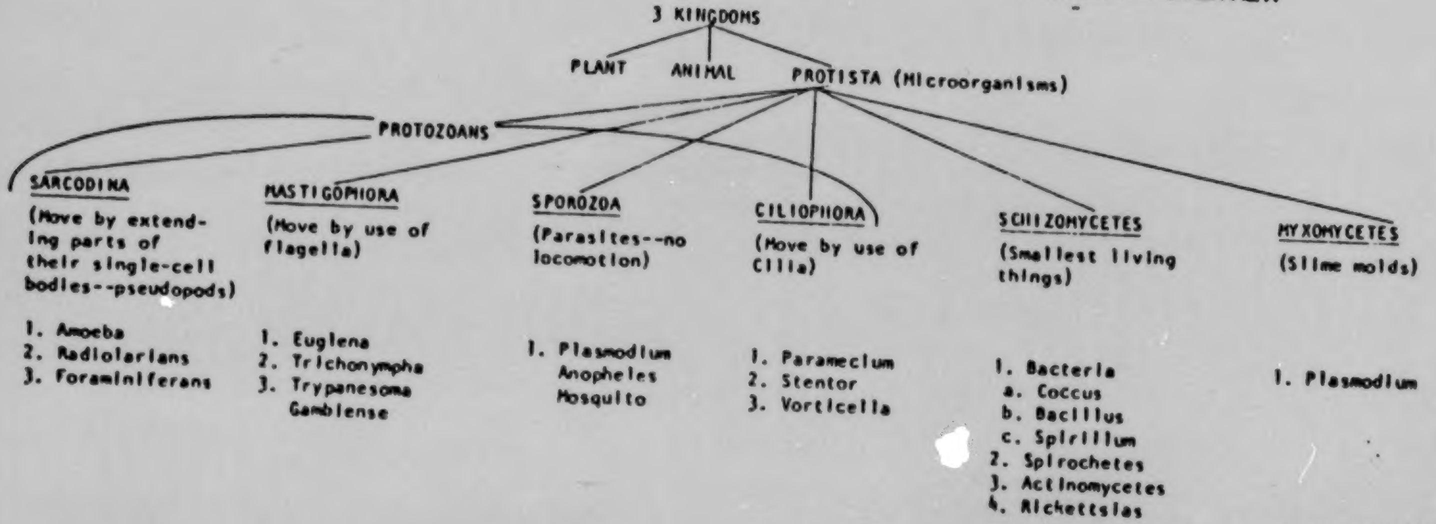
1. Present a partially completed structure and ask students to complete it as they read the chapter.

2. Use the ARMS strategy for pupil initiated key concepts.

INCOMPLETE STRUCTURED OVERVIEW


3 KINGDOMS
PLANT
ANIMAL
PROTISTA (Microorganisms)
SARCODINA
(Move by extending parts of their single-cell bodies --pseudopods)
1. Amoeba
2.
3.
MASTIGOPHORA
(Move by use of flagella)
1.
2.
3.
SPOROZOA
(Parasites--no locomotion)
1.
CILIOPHORA
( )
1. Paramecium
2.
3.
SCHIZOMYCETES
( )
1. Bacteria
a. Coccus
b.
c.
2.
3.
4.
MYXOMYCETES
( )
1.

STRUCTURED OVERVIEW


3 KINGDOMS
PLANT
ANIMAL
PROTISTA (Microorganisms)
PROTOZOANS
SARCODINA
(Move by extending parts of their single-cell bodies--pseudopods)
1. Amoeba
2. Radiolarians
3. Foraminiferans
MASTIGOPHORA
(Move by use of flagella)
1. Euglena
2. Trichonympha
3. Trypanesoma Gambiense
SPOROZOA
(Parasites--no locomotion)
1. Plasmodium Anopheles Mosquito
CILIOPHORA
(Move by use of Cilia)
1. Paramecium
2. Stentor
3. Vorticella
SCHIZOMYCETES
(Smallest living things)
1. Bacteria
a. Coccus
b. Bacillus
c. Spirillum
2. Spirochetes
3. Actinomycetes
4. Rickettsias
MYXOMYCETES
(Slime molds)
1. Plasmodium

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ARMS (Anticipate, Read, Map, Summarize) Strategy (see Busch, 1983)

Rationale:

To demonstrate to students that what is already known can be used to predict what will be encountered in a text. Based on previous experiences, one develops a schema, a set of expectations about different texts.

Evaluation: (Who are you teaching?)

This strategy will benefit the student who has difficulty in relating prior knowledge to information presented in the text as well as provide a schema for the material to be read.

Procedure:

1. Put title on chalkboard from a pre-selected short article.
2. Have students list 5-7 items they know about the title or predict will be in the article.
3. Students share ideas they listed. Participants may add or delete any items from their lists.
4. Choose 5-6 items and organize into a diagram.
5. Skim article, note subheading, illustrations and diagrams.
6. Annotate article, underlining main ideas and paraphrasing information in the margins of the text.
7. Put key concepts from article on 3x5 cards, one concept per card.
8. Arrange cards into a schema map showing relationships among ideas.
9. Draw map on paper.
10. Use map to write a summary of the article.
11. Have students compare their new map with their map of their prior knowledge about the topic and indicate the areas in which there are differences. This procedure demonstrates to the student areas in which learning has been enhanced.

Text Encounters of the Predicting Mind (see Busch, 1983)

Rationale:

To demonstrate that what is already known can be used to predict what will be encountered in a text. Based on previous experiences, one develops a schema, a set of expectations about different texts. Use of these schema enables the reader to understand and organize information.

Evaluation: (Who are you teaching?)

This strategy will benefit the student who possesses the appropriate schema but fails to bring it into focus for purposes of comprehending a particular passage.

Procedure:

1. Put title of history text on chalkboard.
2. Have students make a list of things they predict will be found in the chapter. This can include comments regarding graphics expected to be included in the text.
3. Skim through the chapter looking at headings, subheadings, graphics, etc.
4. Return to first subheading and predict 2 or 3 items.
5. Read subsection and assess how close predictions were.
6. Repeat predictions and evaluations throughout chapter.

Make Your Own Adventure (see Busch, 1983)

Rationale:

Students learn story structures by listening to various literature. One way of continuing to develop a "sense of story" for various materials is to reconstruct and compare schemata.

Evaluation: (Who are you teaching?)

Students who need to further develop a "sense of story" or who have difficulty in predicting should benefit from this strategy.

Procedure:

1. Select a narrative that has an easily identifiable beginning, plot development and ending. The story can be from a content area (social studies or science) or other narrative. Cut the story into 3-6 sections, depending on the reader's abilities. Each section must be long enough to give the readers something substantial to read -- even though they might be reading something from the middle of the selection.
2. Ask each student in the group to read the selection silently, thinking what must have happened before and after that particular excerpt.
3. After reading silently, ask who might have the beginning of the story. Student reads it aloud. The other students listen to see if they agree that the beginning has been chosen and to see if they have the next section. Proceed through the story in a similar manner, making and testing predictions, discussing the sections and listening to each other.

Variations/Extensions:

1. In social studies or science, this strategy could serve as a useful review of the chapter, if the summary statement was used. It could be used with several groups simultaneously to involve more people.
2. Students could write their own selection that have a distinct beginning, middle and end, to be used by the whole group for Schema Story material.
3. Students in the group could put sections 1-5 in order in the group, and then each person write the ending. Then all the endings would be read and discussed.

Resources:

1. Old textbooks that are no longer being used can be cut up.
2. Scholastic Scope and Sprint magazines.
3. Recipes, brochures, or directions for games.
4. Articles from the newspaper.

Using Context to Develop Meaning (see Busch, 1983)

Rationale:

Reading involves the integrated use of all the cueing systems -- the words, the grammar of the sentence and the meaning of the sentence and passage. This lesson helps the reader make better use of the cues from the meaning system, as well as those from the grammar system.

Evaluation: (Who are you teaching?)

Students who concentrate only on print and don't "read for meaning" will benefit from this lesson. Also, students would benefit who make some use of context within a sentence but not in the whole text.

Procedure:

1. Tell the students that they will be reading a text in which there may be an unknown word. During the reading, the students will discover the meaning of the unknown word. (An example passage is at the end of this strategy lesson.)

2. Using an overhead projector, reveal one sentence of the text to the students. Students predict the meaning of the word which is unknown or produce a synonym. Write all the predictions on the board. Accept all predictions and encourage the students to do likewise. Reveal the second sentence and cross out all predictions that all the students agree are not appropriate.

3. Add new predictions. Continue in this manner until all the text is read. More than one word may make sense, but not usually.

Variations/Extensions:

1. This can also be used by smaller groups or even by pairs of students. The students could also make individual predictions and discuss their predictions after the text is totally revealed.

2. Students can play the game of "Who Am I?" or What Am I?" giving clues which progress from the more general to the more specific. "Who Am I?" or "What Am I?" could also be written in prose or poetry and then exchanged.

3. Using pictures of the "Who" or "What" on one side of a paper, the clues could be written on the other side. This could be made into a book which could be useful in the content areas for building concept background.

Debate (see Watson, 1985)

Rationale:

This strategy helps students realize that they need to make decisions as they read, such as agreement or disagreement with the point of view presented.

Evaluation: (Who are you teaching?)

This strategy will benefit students who need to take a more active part in the reading process.

Procedure:

1. Ask students to read a selection such as an editorial from a newspaper or magazine, presenting a point of view on a particular subject. As them to consider as they read whether they agree or disagree with the author's opinions.

2. Ask students to read the selection a second time and underline with blue ink all the statements with which they agree. All the statements with which they disagree sould be underlined with red ink.

3. Open discussion after the second reading. Encourage students to talk first about statements the author made with which they agree. Next, discuss comments with which they disagree. Encourage students to explain their opinions and why they agree or disagree with the author.

4. Throughout the discussion students should be encouraged to challenge each other's statements. Emphasize the use of tact when challenging.

Variations/Extensions:

1. Students read several authors' opinions on a contemporary issue and compare their views.

2. Students could gather information and debate certain issues.

CHAPTER 7

A NEW LENS FOR READING COMPREHENSION: COMPREHENSION PROCESSES AS CRITICAL THINKING

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INTRODUCTION

A recent trend in reading theory and research has been to view reading as a process of critically examining and evaluating the ideas of an author and constructing personal interpretations of texts. The following classroom discussion is an example of children who respond to texts as critical thinkers.

> A small group of first grade children are engaged in a literature study of the story, The Three Billy Goats Gruff. The discussion is an open-ended one in which the children freely discuss their personal interpretations of the story and the teacher facilitates the discussion with occasional open-ended questions. As they discuss the characters in the story, the children begin talking about whether or not the troll had a right to be upset when the billy goats went over the bridge. Sherri says that he did because the bridge was his home and the goats were too loud going over his home. "He needed to relax and so he got mad at them." "Yes," says Stephanie. "He wanted to sleep and get his rest or maybe he was trying to eat and they disturbed him." She goes on to say that maybe the troll used to be kind and nice but then he got angry and so now is mean. Erin takes the other side of the argument and says that the troll should not have gotten upset because "bridges are supposed to be shared."
>
> As the discussion of the characters continues, the children debate about which of the billy goats was the bravest. Richard claims that the biggest billy goat was because "he knocked the troll down" but Erin counters by pointing out that "the littlest had to go first to face the troll" and so was the bravest. Kristine argues back that the first billy goat wasn't the bravest because it didn't know about the troll. As the conversation continues, Sherri points out that the billy goats might have all gotten eaten up. The teacher asks why they think the author didn't have this happen and instead had all the billy goats escape. Richard answers, "He probably likes goats." Sherri takes another point of view and states, "He wanted it neater and not so sad. He didn't want any crying." "Yes," says Sheila. "The person who is reading might stop at that page and not read on because it would be too sad if all the billy goats die." The group goes on talking about why authors use happy endings and their effect on the reader. (Short, field notes: 1985)

The children engaged in this discussion are critical readers who examine and evaluate the characters' actions and motivations as well as the author's rationale for the happy ending of the story. They freely pull in their own personal experiences from their own worlds and from other texts they have read in the past in constructing their own meanings for this well known folktale.

In recent years, there has been a growing recognition that reading is an active thinking process in which the reader makes efficient use of strategies to construct meaning from print. (Goodman, 1983; Smith, 1978) The emphasis on reading comprehension as a critical thinking process has provided a new lens for looking at and understanding comprehension processes. This recognition is reflected in the recent trends in research on reading comprehension which were discussed in Chapter 5: the acknowledgement of the active role of the reader and a focus on higher levels of cognitive processing in reading. At the same time, the National Assessment of Educational Progress (NAEP) reports that while most students are learning basic reading skills, they are not learning how to analyze or evaluate what they read. The NAEP points out that the end result is an emphasis on "shallow and superficial opinions at the expense of reasoned and disciplined thought." (EDUCATION USA, 1981: 89)

Recent national reports on schools by Boyer (1984), Sizer (1984), and Goodlad (1983) have picked up on this concern and have called for increased attention in schools to problem-solving, reasoning and critical thinking. There appears to be a growing realization that the emphasis on "basic" skills has had a negative impact on students' abilities to actively interact with, and critically evaluate written text. Teachers are being urged to give greater attention in their classrooms to critical thinking and reasoning. Based on the various reports, it becomes obvious that the classroom described above where children are active, critical readers and thinkers is not a typical classroom. Most classrooms are not places where students are currently encouraged to critically examine and evaluate their own ideas and the ideas of their peers as well as the authors of both the fiction and non-fiction texts that they read.

This emphasis on reading as a process of critical thinking or reasoning is not new. In 1917, Thorndike suggested that reading was a form of reasoning and that reading comprehension should be viewed as a process similar to that described as taking place during problem-solving activities. In 1937, the Committee on Reading of the National Society for the Study of Education stated, "Any conception of reading that fails to include reflection, critical evaluation and clarification of meaning is inadequate." (Gray, 1937) More recently, Stauffer (1975) stated that reading is largely a thinking process and Clark (1975) suggested that reading was a problem-solving process in which the reader uses various strategies to relate the author's message to information in memory. Rosenblatt (1978) developed the viewpoint that reading is a transactional process where the reader actively *constructs* a text during reading through transactions with the published text. Meaning does not simply pass between the writer and the reader but is represented by a writer in a text and constructed from the text by the reader.

Recent research lends support for the notion of reading as a problem solving process. Olshavsky (1976) used protocal analysis to identify strategies readers use. She believes that the types of strategies that were identified lend support for a theoretical position that reading is a problem-solving process. Olshavsky suggests that readers identify problems and then apply strategies to solve these problems. Yeazell (1982) found that when children are taught to reason using techniques of logic and are encouraged to think reflectively and critically about the materials they read, that their scores on standardized reading tests are higher. Yeazell states that the skills of logical and critical thinking have a definite place in the elementary curriculum and are the real "basics."

To suggest that reading is critical thinking is to suggest that effective teachers understand critical thinking and utilize methods found effective in improving critical thinking. This chapter will consider both of these needs by 1) discussing the three components of critical thinking and 2) providing an overview of current reading comprehension instructional research to see whether the instructional strategies included in this research offer teachers practical alternatives on how to develop the critical thinking abilities of their students. Our close examination of this research has led us to believe that very few instructional procedures in the research enhance critical thinking. Based on the current move in the field towards defining reading as critical thinking, this becomes an important issue for both teachers and researchers to explore.

THE THREE COMPONENTS OF CRITICAL THINKING

In order to examine how classrooms can enhance critical thinking, one must first have a definition of critical thinking. It is usually defined as the process of making judgments. (Harris and Hodges, 1981) Gray's (1937) description of it as including reflection, critical evaluation, and clarification of meaning is helpful in trying to understand what is meant by critical thinking. Critical reading simply means that one is using the critical thinking process but applying it to written language as one reads. The person who has probably done the most extensive work on critical thinking is Charles Sanders Peirce (1839-1914). Peirce was an American philosopher who wrote and thought about the topic of logic or critical thinking and developed a description of the process of critical thinking. Peirce's description of critical thinking remains general enough to keep it at the level of a general cognitive strategy that underlies thinking and specific enough to be able to discuss the components of it and evaluate instruction to see whether it really is enhancing critical thinking. Because of this, Peirce's definition of critical thinking will be used as the basis of this chapter.

Peirce saw critical thinking as the method through which knowledge develops and inquiry takes place. He defined critical thinking or reasoning as a process in which the reasoner consciously makes a judgment or conclusion regarding the truth of something. Peirce maintained that reasoning does not begin until a conscious judgment has been formed. The subconscious cognitive operations prior to this judgment are not subject to logical analysis and so are not critical thinking. (Peirce, 1966)

Peirce discussed three components of critical thinking which he saw as occuring in cyclical stages. The following example may be helpful in understanding how the process of critical thinking might operate for a reader.

The reader is reading the following passage which he/she has predicted will be about people talking about the animals at the zoo.

> A DAY AT THE ZOO
>
> The day was bright and sunny--a good day to be at the zoo. Many animal sounds and shouts of laughter filled the air.
>
> "Look at that funny fellow!" said Ambrose.
>
> "Throw him a peanut, quick, before he turns away!" cried Judy.
>
> "Oh, he caught it and is going to throw it back! Clever fellow. Sometimes they seem fairly bright, don't they?"
>
> "He's scratching his head. They always scratch their heads. Maybe they think it makes them look wise, but they're probably looking for fleas."
>
> "It's feeding time! First one down in a rotten monkey!" Ambrose shouted as he swung himself deftly down from the top of the cage to the floor.
>
> "Oh, Ambrose, wait for me," cried Judy. "Visitor's Day at the zoo gives me such an appetite."
>
> by Charlotte Hazelwood (Goodman and Burke, 1980:158)

The reader continues with the prediction that the passage is a conversation between people about animals at the zoo guiding his/her reading until the reader gets to the sentence about feeding time. At this point, the reader is confronted with an anomaly because this is not a statement he/she would expect to hear a person say about an animal. Even if the reader is not bothered by this statement, the next several sentences will definitely produce an anomaly for the reader. As the reader continues reading these next sentences, he/she searches for an explanation that will explain how these sentences fit into a story about the zoo. The reader will probably attempt to use what he/she knows about stories, about conversations, the zoo, people, and monkeys to try and resolve this conflict with the reader's initial expectations for the story. The hypothesis, "Oh, it's monkey talking about people." will suddenly pop into the reader's head as a result of this search for an explanation. The reader will then deduce several ideas that must be true if this really is monkeys, and not people, talking and will either reread or rethink what was earlier read and read ahead to test out the hypothesis that is monkeys talking. Obviously, this whole cycle of critical thinking takes place in several seconds and it would probably be difficult for a reader to discuss exactly what processes of thought took place. However, there is a conscious realization that something is wrong, which results in an hypothesis and then reading on to confirm that hypothesis.

ABDUCTION

Peirce believed that every instance of critical thinking begins with the observation of something that is surprising, something that would not have been expected and so serves as an anomaly. This anomaly is not the same as cognitive dissonance as discussed by Piaget because an anomaly is a transaction between both environmental and cognitive phenomena.(Harste, 1984) This anomaly causes a person to stop and think and search to find some point of view or circumstance that will explain the unusual occurrence. In the zoo story, the conversation produces an anomaly because it conflicts with the reader's expectations. The person eventually comes up with an hypothesis that supplies a possible explanation or guess for why the surprising fact occurred. Peirce suggested that this occurs because the person is looking for a resemblance and notices some remarkable character or relation among the features of the unusual occurrence and recognizes this as characteristic of some conception which is already stored in the person's mind from past experiences. This process suggests a theory or hypothesis which could explain the surprising occurence. The person also then needs to decide whether or not this hypothesis seems plausible enough to go ahead and test out. Peirce called this process abduction and considered it the first component of critical thinking. What the person has done is to reason from an effect to a possible cause for that surprising effect and then evaluated the possible truth of that hypothesis. (Peirce, 1966) In the example given, abduction involves coming up with a possible explanation for the unusual conversation between the two characters and then deciding to go ahead and test out the hypothesis that this could be animals rather than people talking.

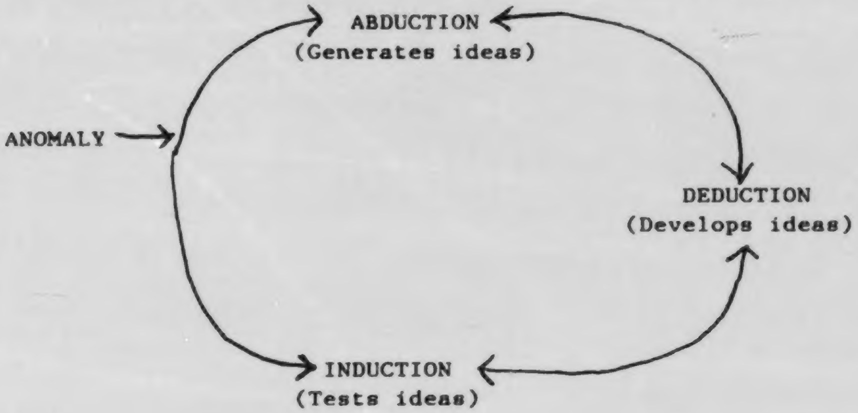
DEDUCTION

Abduction is hypothesizing a possible explanation for the surprising occurrence but this hypothesis must now be tested to see whether it really could be an explanation for what occurred. This testing does not begin by examining the surprising fact but by examining the hypothesis that the characters are monkeys to see what kind of predictions could be made about what should occur if one accepts the hypothesis. The person thinks through all the possible implications and consequences which would follow from holding that this idea or hypothesis is true. This process Peirce called deduction and consists of reasoning from the general idea to specific ideas that would necessarily follow from holding the general idea. Peirce pointed out that the person may actually form a diagram in their minds to reason through all the possible consequences of the hypothesis. (Peirce, 1966)

INDUCTION

Once these possible consequences have been explicated, the third component of critical thinking takes place. In this component of critical thinking, the person is concerned with taking these consequences and testing them out against experience to see whether the hypothesis makes sense or requires some modification or if it needs to be totally rejected. If the hypothesis is rejected or needs to be modified, the entire cycle begins again. This testing out of the hypothesis against experience is called induction. In the example, induction consists of testing out the hypothesis that this conversation is between monkeys as the reader continues reading the rest of the passage. Induction does not originate a new idea but begins with a theory suggested by abduction and tests out how well predictions based on that theory correspond with experience. The essential role of induction is that the process of testing out allows us as thinkers to eventually correct our reasoning. (Peirce, 1966)

FIGURE 1: THE COMPONENTS OF THE CRITICAL THINKING CYCLE



Peirce believed that these three are the only three components of critical thinking. However, he also pointed out that critical thinking does not tend to be purely one component but rather that the three occur together and are not separable. (Peirce, 1966) Therefore, attempting to look at one component of critical thinking totally separate from the cycle in which they operate interdependently will cause misconceptions about that component of critical thinking.

While induction and deduction are commonly discussed by many other philosophers, abduction is often omitted as a form of critical thinking. Peirce pointed out the necessity of abduction to the process of inquiry in that it is the only component of critical thinking which can contribute a new concept. If we did not have this component of critical thinking available to us, we would not be able to add new ideas and make new connections between old ideas but would simply be able to explicate and evaluate the ideas we already have. Without abduction, the reader of the zoo passage would continue to read and evaluate the passage based on the earlier hypothesis that this passage was about people conversing at the zoo about the monkeys. Deduction simply states what would ideally and necessarily follow if we hold a certain theory or hypothesis while induction sets out with a theory and measures how well it agrees with experiences or facts. Therefore, neither can originate a new idea. (Peirce, 1966)

Peirce attempted to clarify the distinctions between the three components of critical thinking by pointing out that deduction proves that something must be; induction shows that something actually is operating; and abduction suggests that something may be. From the suggestion that comes from abduction, deduction can draw a prediction that can be tested by induction but, if we are ever to learn anything new or to understand phenomena at all, it must be by abduction that this is brought about. The new ideas generated by abduction are ideas that are new for the individual person. The reader has put together two ideas that previously were not connected and so generates or creates a new idea or hypothesis of explanation. Abduction seeks theory or understanding while induction seeks facts. (Peirce, 1966)

Critical thinking is a move from the known to the unknown. Abduction, deduction and induction provide different paths of critical thinking. Abduction generates ideas, deduction develops them, and induction tests the ideas out. To be effective, instructional strategies in reading comprehension need to enhance students' use of all three components of critical thinking so that they become creative and critical evaluative readers.

The next section of this chapter will 1) review instructional research in reading comprehension in light of Peirce's three components of critical thinking to see if the instructional strategies researched attempt to develop critical thinking abilities and, if they do, 2) to determine the component(s) of critical thinking they focused on, keeping in mind, Peirce's notions of being cyclical and the three components as being inter-related.

READING COMPREHENSION INSTRUCTIONAL RESEARCH

The research that will be reported here is based on a data base of the approximately 175 instructional studies out of more than 570 reading comprehension studies published between 1974 and 1984. This data base was established as part of the USDE funded research project. A study is considered instructional if the intention of the study was to teach students using a technique that would in some way affect reading comprehension.

All instructional treatments were coded into one of ten levels of cognitive processing. The first levels of processing strategies involved strategies aimed at factual recall, identifying word meanings and identifying text structure. These categories were seen primarily as reflecting the point of view that reading is information transfer from the text to the reader. The second level of categories considered reading as a cognitive process which involves interaction between the reader and the text. These categories went beyond ideas stated directly in texts and included drawing inferences, schema construction, schema maintenance, schema selection, prediction, and chunking or summarizing written information. The third set of processing strategies were based on a transactional notion of cognitive processing where both the reader and the text are seen as being changed in the process of reading and a new meaning is constructed that goes beyond either the text or the reader. This set of categories involved using transmediation and analogies or metaphors to increase comprehension. The category of transmediation included studies in which there was a move between the written communication system and some other type of communication system such as imaging or drama. As most of the research coded fell into six of these ten categories - identifying word meanings, identifying text structure, inferencing, macro-operators (summarizing), transmediation, and metaphor/analogy - only strategies from instructional studies in these six categories will be examined below.

FIGURE 2: COGNITIVE PROCESSING CATEGORIES

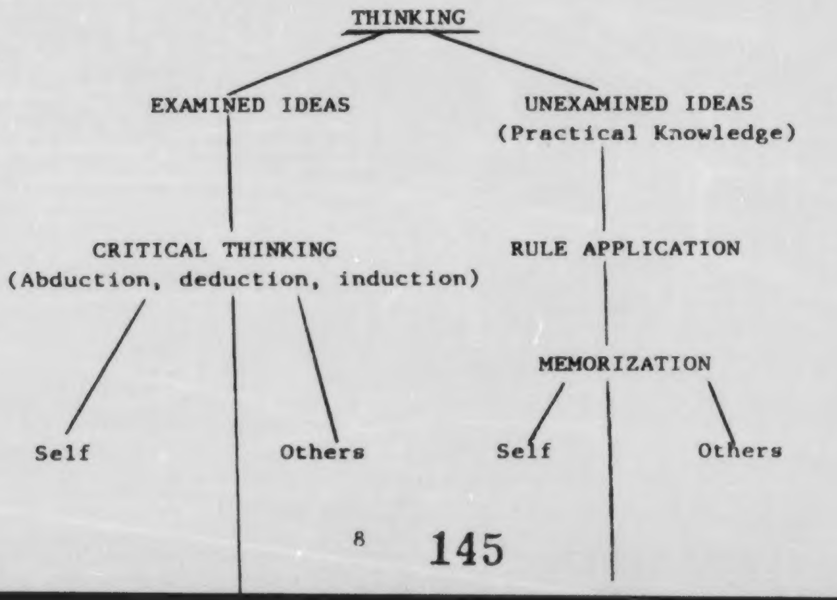
LEVEL I - INFORMATION TRANSFER
Factual recall
* Identifying word meanings
* Identifying text structures

LEVEL II - INTERACTION
* Inference
Schema construction
Schema selection
Prediction
* Macro-operators (summarizing)

LEVEL III - TRANSACTION
* Transmediation
* Analogies and metaphors

An examination of instructional studies in these six categories revealed a number of concerns about whether the instructional strategies in research are effective in enhancing critical thinking. Many of the instructional strategies involved having students apply a rule which has been generated and given to the student by the teacher. Some instructional strategies had the student repeat something from memory. While critical thinking, applying a rule and memorization are all thinking processes, they represent different kinds of thinking as the following diagram tries to illustrate.

FIGURE 3: THINKING


THINKING
EXAMINED IDEAS
UNEXAMINED IDEAS
(Practical Knowledge)
CRITICAL THINKING
(Abduction, deduction, induction)
RULE APPLICATION
MEMORIZATION
Self
Others
Self
Others

In rule application and memorization, the teacher is the active critical thinker while the students are expected to simply take the rule as a given and apply it. They are not involved in testing the rule out. In critical thinking, the student generates, explicates and evaluates a rule or hypothesis. The student is actively examining ideas like the first grade students described at the beginning of this chapter. When a student is to take an apply a given rule, he or she does not examine ideas and so this does not facilitate critical thinking and reading.

In addition, it is apparent in these studies that although Peirce maintains that each of the three components of critical thinking are interdependent, instructional strategies which do involve critical thinking often have the teacher involved in abduction and the students in deduction and/or induction.

Another concern that emerged from an examination of the instructional strategies in research is that the dependent measures used by researchers were not open-ended enough to measure the critical thinking that students engaged in during the instructional procedure. Critical thinking is a generative process where students develop and test out their own hypotheses about what they are reading. Because these hypotheses are based on personal experiences as these transact with the text and everyone has different personal experiences, it seems improbable that all readers would have the same hypotheses and interpretations of a text. However, researchers continue to evaluate the effectiveness of a strategy by measuring the students' comprehension against their own "correct" model of what the student should have come up with. This issue is discussed further in Chapter 11 of this book.

The next section of this chapter will look at specific studies in each of the six major categories of cognitive processing in order to 1) examine the concerns noted above about the effectiveness of instructional strategies in enhancing critical thinking and to 2) see which instructional strategies offer the most potential in encouraging critical thinking.

IDENTIFYING WORD MEANINGS

Several studies attempted to teach students word meanings and then measured the effect of this instruction on comprehension. Pany, Jenkins and Schreck (1982) compared three instructional treatments for vocabulary knowledge. In the first, Meanings from Context, students read two sentences in which the first contained the target word and the second contained a synonym for that word. In the second treatment, Meanings Given, students read a sentence containing the word and then the experimenter gave the student a synonym for the word and a sample sentence containing the word. In the third treatment, Meanings Practiced, the student read the single word, was told the synonym and sample sentence by the experimenter, and then repeated the word and synonym.

In the first procedure, the reader is given the chance to abduce a meaning for the unknown word but because there are only two sentences there is no support for developing or testing this hypothesis out. The reader does not really have to critically think about the meaning of the word because there are only two sentences and no real need therefore to grapple with the word. In the other two procedures, the reader does not have to think critically at all because the researcher tells the reader exactly what he/she needs to know and all the reader has to do is to repeat back exactly what the researcher has said. There is no active involvement of the reader's critical thinking processes. This is reflected in the findings that while the readers in the Meanings Practiced treatment scored better on isolated vocabulary tests, there were no differences between the three groups on measures of passage comprehension.

Vaughan, Castle, Gilbert, and Love (1982) compared the definition approach with an experience based approach. In the definition approach, the teacher told students the definitions of the words and the students repeated back what the teacher said. In this approach, the students are not engaged in any of the three components of critical thinking as defined by Peirce.

In the experience based approach, the teacher had the students discuss terms similar to the key word and then gradually moved students towards the key word. In this condition, the teacher is the one that does the initial critical thinking; the students simply have to inductively test out the teacher's hypothesis. The teacher decided that the word would be an anomaly, deduced the crucial components of the word's meaning and then presented these to the students. While the experience based approach does involve students more actively in critical thinking than the definition approach, the teacher is the only person who appears to benefit from active thinking through abduction.

Bridge, Winograd, and Haley (1983) took a different instructional approach to learning vocabulary words. They involved students in reading predictable materials (patterned language books and dictated language experience stories) while the control group read in the regular basal preprimer and followed the instructional suggestions in the teacher's manual. The predictable materials group read the patterned book or experience chart using shared reading and choral reading and then matched sentence and word strips to the lines from the story. The students using the predictable materials learned more target and non-target words than children from the preprimer group.

Both the type of reading materials and the instructional procedures used by the predictable materials group supported the critical reading of the students. They dealt with words within the context of a whole story and were not required to produce the teacher's definitions for the words. Instead they could generate hypotheses about the words, make predictions based on these hypotheses and then test them out because of the repeated readings and the rich context of a unified text. The children using the predictable materials appeared to be making better use of context clues and so were using syntactic and semantic cues rather than only graphophonic information.

IDENTIFYING TEXT STRUCTURES

This category of instructional research primarily identified studies which taught children strategies aimed at identifying different levels of text structures. Weaver (1979) investigated how to improve reading comprehension through working with sentence structure. She taught students a sentence anagram task and word-grouping strategy aimed at getting them to "chunk" words into higher order units by teaching them how to arrange words systematically into phrases and then to arrange the phrases into sentences. The thinking processes involved in this strategy appear to involve applying a rule given to the students by the researcher. Critical thinking strategies are not involved because not only are the children not involved in generating the rule, but they are also not involved in testing out the rule. The rule is a given and they are to apply it to experience, not test it out against experience.

Sampson, Valmont, and Van Allen (1982) focused on syntactic structure in an instructional strategy using cloze materials in which words were selectively deleted in order to emphasize a particular syntactical relationship such as adverbs. After completing the cloze passages, students met with the teacher to discuss the variety of possible answers which would make sense semantically and syntactically in the passages.

It would appear that the blanks in the cloze passage could cause an anomaly for the reader. The reader would need to make an abduction or hypothesis about what the word is, make some deductions about what should come next based on that hypothesis, and then test that hypothesis out as the reader continues reading the passage. Because the instructional procedure involved accepting any answer that made sense syntactically and semantically and did not require the reader to match an answer exactly with the researcher's answer, the strategy allowed the flexibility readers needed in using their own background knowledge to generate hypotheses. However, the dependent measures were more restrictive in their view of language and so did not fully measure the generativeness of the critical thinking strategies involved in the instructional procedures.

Cohen and Stover (1981) developed an instructional procedure to help students deal with the structural format variables of math word problems. They identified three format variables by analyzing the word problems that gifted students had rewritten to make easier for their peers. One group was taught how to add diagrams to word problems, another was taught how to identify and remove extraneous information from word problems, and the third was taught to rearrange the order to numerical presentations of numbers in word problems. Cohen and Stover point out that the students in all three groups possessed the math concepts and skills needed to perform the "mathematics" of the word problems but their increased performance on word problems after the instructional treatment demonstrated that the students needed comprehension strategies for the word problems.

As in some of the studies discussed earlier, this study involved the students being taught a rule and then having to apply it. Each group of students dealt with only one of the structural variables in their training and so they were not even having to choose among rules in their instructional sessions. They were not involved in generating or testing the rule but only in applying it. The students engaged in the first experiment who rewrote problems to make them easier for others would seem to have gone through the cycle of critical thinking as they had to generate an idea of something they thought would make a certain math word problem easier for others and use this in rewriting the problem.

Andre' and Anderson (1978) taught students how to generate their own questions about text materials being read. In order to do this, students needed to be able to identify the text structure, especially in relation to main ideas. Students were given a description of the technique and the steps involved and then practiced generating questions for paragraphs and comparing their questions with the researchers' questions for the same passages. The steps involved in generating questions were 1) to identify the main idea of the paragraph; 2) to form questions which asked for new instances of ideas and/or concepts; and 3) to ask a question about a concept in the text, but in a paraphrased format, if generating a new instance was difficult or inappropriate. This self-questioning strategy does appear to involve the critical thinking strategies of deduction and induction. The reader is asked to deduce questions based on predictions of new instances from the main idea and then to continue reading, searching for answers for those questions. What is not explained in the procedure is how the reader deals with predicted questions which cannot be answered in the text or how the reader comes up with the main idea. While the reader might hypothesize the main idea using the process of abduction, that is not what appears to happen in this study. The main idea appears to be stated directly at the beginning of the passage and the reader is not involved in hypothesizing and testing out what the main idea is. Students who went through this procedure were then tested on the main ideas and details in the passages and were expected to come up with the researchers' interpretation of the passages. This was also true in the training procedure where even the questions generated by the reader were measured against the researchers' questions. The researchers are the ones who engaged in abductive reasoning and the readers are now expected to match their thinking with the researchers rather than reasoning it through on their own.

Schumaker, Deshler, Alley, Warner, and Denton (1982) taught students labeled learning disabled a learning strategy called Multipass which required students to make three "passes" through a chapter for a particular purpose. Each pass involved a different use of the text structure of that chapter. The first pass, Survey Pass, involved skimming titles, introductory paragraphs, headings, illustrations and summaries and then writing a paraphrase of the information gained. The second pass, Size-Up Pass, required students to read the questions at the end of the chapter, look through the chapter for textual cues and then make the cues into questions, skim to find the answers to the questions, and paraphrase the answers to the questions. The last pass, Sort-Out Pass, involved the students answering the questions at the end of the chapter and skimming the section they thought the answer would be in if they could not answer the question. The students went through a series of instructional procedures in which the strategy was described and modeled and then rehearsed and practiced with feedback in various materials.

While it would appear that this strategy should involve the three critical thinking processes, the way in which the strategy was presented and tested by the researchers made it an application of a rule rather than a reasoning through of a rule. The first step, Survey Pass, could be a generative step where the reader would generate an hypothesis that would then be broken down into possible predictions using deduction and tested out using induction during the last two passes through the material. However, the researchers required the students to come up with the researchers' "correct" answers in each step of the teaching of the strategy and emphasized remembering facts from the chapters being read in the testing done to evaluate the effectiveness of the strategy. Thus, students were expected to take and apply a rule given to them by the researcher rather than to generate and use their own hypotheses.

INFERENCING

Researchers have explored a wide variety of instructional procedures to teach inferencing during the reading process. Rowe in Chapter 7 points out that slightly more than one-fourth of the instructional studies focusing on processing strategies in the USOE data base had a dominant focus on inference instruction.

Hansen (1981) tested two instructional techniques designed to develop readers' abilities to draw inferences between print and prior knowledge. The first method, the Strategy method, was based on a weaving metaphor. The experimenter selected three important ideas from the story and first asked questions of the children which related to some possible previous experiences they had had and then asked them to hypothesize something similar that might happen in the story. The hypotheses and previous experiences were written on slips of paper and actually woven together to illustrate the strategy of integrating the new with the known. The second strategy, the Question method, involved asking only inferential questions to the group after the reading of a story.

The Strategy method did involve students in generating hypotheses although the strategy stopped at this point and did not go on to encourage students to make predictions based on these hypotheses and then test out the hypotheses during reading. It appears that the researcher did assume that this was what students did as they read.

The Question method used inferential questions at the end of reading. It may be that students began to anticipate this type of question after a number of stories and began reading looking for anomalies and attempting to deal with them because of the awareness that they would need to answer inferential questions after reading. However, this strategy does not appear to directly deal with developing critical thinking strategies. Although the first strategy does appear to concern itself with critical thinking strategies, the tests used to measure reading comprehension at the end of the study involve the student being measured against what the researcher has determined are the "correct" inferences and so do not fully measure the gains in critical thinking made by students during the instruction.

Gordon (1980) developed two instructional strategies aimed at improving reading comprehension through more active involvement of the reader. The Inference-Awareness Group were taught how to use cues from the text and from their prior knowledge in order to draw inferences during reading. This involved a step-by-step modeling and feedback technique in which the teacher began by stating both the inference and the examples that supported it, moved to stating only the inference and having students find the supporting examples, and then finally to students generating both the inference and finding the examples. However, while the students were gradually moved to independence from the teacher, even in the last step the teacher asked a question which required the students to make an inference so the teacher was still introducing the anomaly rather than the students. This strategy appeared to be primarily focusing on the critical thinking strategy of induction, on how to test out an inference or hypothesis by looking for supporting examples.

The second group, the Content and Structure Group, developed the students' background content for each story and awareness of the superordinate text structures for the story. Background knowledge considered to be important to the story was developed through various kinds of prereading activities such as analogies, word associations, semantic mapping and examples of word definitions. Instruction in structure consisted of a teacher-directed search for superordinate statements for each category in a narrative story grammar. The teacher attempted to help children build an abstract general schema for how stories are organized. The children were given the overall diagram of the story structure and asked to fill in some of the slots which had been left empty. The teacher is the most active reasoner in this instructional strategy. In the structure part of the strategy, students are simply applying a rule that is a given, rather than testing out the model of story structure being used. The prereading strategies would appear to give students some additional information that they could then draw upon during reading in order to make hypotheses and predictions. However, while these strategies appear to facilitate abduction and deduction, they do not appear to directly work at developing these critical thinking strategies as the inferencing strategy did for induction. This is also reflected in the findings which showed on several tests that the Inference-Awareness group made greater gains than the Content and Structure group. However, the testing used to measure the effects of the study again are closed measures of reading where the researcher is measuring the reader's comprehension against a "correct" interpretation and so does not fully measure the critical thinking of the students.

Idol-Maestas (1983) taught students labeled learning disabled to use a strategy involving guided probes before they began to read. The strategy was based on the acronym, TELLS Fact or Fiction. The strategy involved guessing general story context from the title, scanning for clues to general context and difficult words, determining setting, and deciding whether the story was fact or fiction. The researcher believed that this strategy would activate students' prior knowledge and improve both literal and inferential comprehension.

This strategy appears to be primarily an application of a rule. The strategy involved some specific probes in a certain sequence that the student was to ask before beginning to read. The prior knowledge activated by this strategy would seem to have an effect on the reader's ability to generate hypotheses and deduce predictions during reading as the reader was more aware of relevant information to draw upon. The testing involved in this study consisted of responses to specific questions over passages the students had read which again limited information about the students' reasoning processes.

Wixon, Yochum, and Bosky (1984) taught basal stories with the aid of either traditional lesson activities or revised activities that focused on concept development, predicting the relationship between key concepts and story content, and inferential reasoning. Instead of traditional vocabulary lessons, students in the revised lesson were asked through teacher questioning to identify the critical attributes of the concepts, differentiate examples, and to provide definitions and examples of the concepts. This strategy appeared to primarily emphasize deductive reasoning. The teacher had generated the idea and guided students through how to deduce the components of that idea.

During the guided reading, students in the revised lesson were asked to generate predictions about how the vocabulary words would be used in the story. These prediction were written down and then checked for accuracy as the child read the story. Following this, a discussion was held in which students had to support their conclusions in regard to the accuracy of their predictions with evidence from the story. This strategy does appear to involve the three components of critical thinking in that the child generates an hypothesis based on the vocabulary words and then reads the story using deduction and induction to test the hypothesis or prediction out.

The review activity for the revised group was to complete a reasoning guide. (Herber, 1976) Students had to indicate the accuracy of inferential statements and identify a page number in order to support their judgment. This strategy seems to continue the emphasis on inductively testing out hypotheses through examining the evidence.

The revised activities did result in the students' scoring higher on the comprehension measures. These measures included a free recall scored according to a template developed by the researchers and answers to open-ended questions.

Carr, Dewitz, and Patberg (1983) used three procedures to help students increase inferential reading comprehension with expository text: a structured overview to activate background knowledge and organize text information, a cloze procedure to develop inferencing, and a self-monitoring checklist to help students learn to use the strategy independently.

The structured overview appears to be one way to facilitate the critical thinking process during reading because of the resources it provided for the reader to draw upon. The cloze procedure produces anomalies so that the reader must hypothesize an answer and then test out the answer through further reading or thinking. One factor that may have had a negative impact on the critical thinking process in the cloze strategy used in this study was that there appeared to be an emphasis on finding the one right answer for the blank. The self-monitoring checklist gave students a way to monitor for anomalies and strategies to use in testing out hypotheses. Unfortunately, the dependent measures were only of a closed nature consisting of literal comprehension questions and textually implicit questions which accepted only one answer, again limiting the information available about the students' critical thinking strategies. No open-ended assessment devices were used.

Patching, Kameenui, Carnine, Gersten, and Colvin (1983) developed an instructional strategy in which they attempted to directly teach students critical reading skills. The strategy used to instruct students consisted of systematic instruction in which the teacher gave the student the rule several times, had the student repeat the rule and then gave the student several examples to work through using that rule. While the authors purport to be teaching students how to think critically as they read, the strategy they use to teach the students critical thinking consisted of having the student literally repeat after the teacher and directly apply the rule given by the teacher. The rule is a definite given. The student is not testing the rule out but simply applying it exactly as the teacher has directed the student. The measures used to assess this instruction are based on a closed view of language and do not test comprehension in general but only the specific critical reading skills taught to the treatment group.

MACRO-OPERATORS - CATEGORIZING OR SUMMARIZING TEXTS

The studies coded into this category attempt to either teach students some method of learning to use story grammars in comprehension or of summarizing and chunking the information being read. These teaching strategies deal with very broad ways to look at the overall structure of a text or story.

Gordon and Braun (1982) attempted to teach students a story schema to see if it would serve as a transferable framework for storing and retrieving information from stories, for answering questions, and for generating information during writing. Students were first exposed to a simplified organizational structure for narrative stories and asked to fill in some of the categories with specific story content for each story read. Questions were asked first by the teacher and then by students prior to reading the stories. The last sessions involved the students writing narratives in terms of the text structure components.

The treatment is described briefly in the published journal article so it is difficult to tell if the students were simply applying a rule given to them by the teacher or if they moved into critically thinking on their own as they began asking their own questions before reading based on what they knew about narrative structures.

Singer and Donlan (1982) taught students a problem-solving schema for comprehending short stories which included a list of schema-general questions for each story element in the schema. Students were taught to derive their own story-specific questions from the schema-general questions as they read complex short stories. The purpose of teaching the strategy was to teach students to read to find answers to their own questions and to give them a technique to generate these questions through the use of a general schema for short stories. The students in this group were shown content-general questions from which they could generate content-specific questions for the stories they were reading and each day submitted lists of content-specific questions according to what category in the schema they fit.

This instructional strategy appears to give students a way to generate and test out hypotheses as they read. Specifically the strategy seemed to involve deductive reasoning as the student deduced appropriate specific questions from the general questions for each category. The instruction had some elements of having students apply a rule given by the researcher. This is also apparent in the testing in which students were expected to come up with the researchers' point of view in order to be scored as correct.

Bean, Sorter, Singer, and Frazee (1983) taught students a metacognitive strategy for summarizing text materials through using graphic organizers or outlines. Students in one group were taught a three-step procedure for creating a graphic organizer of concepts presented in their history text. Following an initial demonstration, students engaged in guided practice creating graphic organizers in small groups and then individually and were given feedback on their organizers by the teacher. Another group of students generated traditional outlines of lesson concepts. The same procedures were used to teach this group except for the generation of an outline rather than a graphic organizer. Both procedures seem to involve primarily applying a rule supplied by the teacher rather than testing out a rule through critical thinking.

The measures used to assess the effectiveness of the two strategies included multiple-choice questions concerning literal details and a summarization task. In both cases, the students had to come up with an interpretation that matched the researchers' interpretation of the text. The graphic organizer was a more effective strategy than the outline for students as measured on these instruments.

TRANSMEDIATION

Transmediation studies involve movement from one communication system to another. In these studies, the movement is from a communication system involving written language to another sign system such as mental imagery or drama. Each sign system has its own strengths and limitations in expressing meaning and expresses meaning in a way unique to that sign system. (Eisner, 1982) This movement to expressing meaning in another sign system encourages readers to take another perspective on what they know and to therefore construct new understandings and connections between ideas. This movement thus also facilitates the critical thinking process of abduction and encourages new connections between ideas for the reader.

Lesgold, McCormick, and Golinkoff (1975) taught students to draw stick-figure cartoons about the stories they were reading. These sketches were to focus on the main ideas of the story and were drawn over a five-day sequence in which, on the last day, students were asked to imagine their cartoon rather than draw it. They were also taught to use the cartoons as a recall prompt for main ideas and details from the story.

This encouragement of the use of imagery during reading would seem to affect the reasoning process in a number of ways. The change in perspective offered by switching to another sign system would seem to be particularly generative in producing hypotheses about anomalies. Peirce talked about the use of mental diagrams in the deductive process and imaging could also probably be used as one way to test out hypotheses. Thus imaging could facilitate all three components of the critical thinking process, although its primary effect would seem to be in relation to abduction.

Pressley (1976) taught children to make images by telling them to make up pictures in their heads for sentences or passages from stories and then showing them slides of what their pictures should look like. While this strategy encouraged imaging, it also attempted to limit the imaging being done by children to a certain standard or replica of the imaging of the researcher and so limits the abductive process of the reader.

Finch (1982) also asked students to make pictures in their heads and then had the students describe their pictures. The accurateness and completeness of their mental images were discussed with them by the researcher. The researcher attempted to emphasize making images after reading rather than during reading, a process that would not seem as facilitative of the critical thinking process. The most interesting finding of this study was on a questionnaire that Finch administered after the testing in which she discovered that the majority of children in the control group had spontaneously used mental imagery while reading. This finding clearly challenges researchers who believe that students in control groups are not using certain strategies because they have not been taught to do so or that students necessarily learn a strategy from the instructional procedure. They may already be spontaneously using the strategy before instruction.

Siegel (1984) introduced a strategy called "sketch to stretch" where students were asked to draw their interpretations of a variety of written materials. The directions they were given were to "draw what the story means to you" or "draw a sketch that explains what the article means." Sketching was seen as a learning strategy in which children could use art to think about what they had read. Students were given an opportunity to explain their sketches to other children during a sharing time. Directions were given to the children to encourage them to use the sketches as ways to synthesize ideas rather than simply retell the story. These sketches were not held up against a model created by the researcher and so this strategy appears to be more open-ended and generative than some of the other strategies involving art. All the components of critical thinking are involved in this instructional strategy. The students are faced with an anomaly in having to move to another communication system and so generate an hypothesis about how to express meaning in this different system. This hypothesis is explicated and tested out as the students sketch and share their sketches with others.

Henderson and Shanker (1978) used another type of transmediation, interpretive dramatics, as a way to involve students in all three components of critical thinking. Dramatics was used as a follow-up to basal stories in order to develop comprehension skills. After reading a story, the group discussed the characters needed and decided how each person would participate (actors or directors). The meaning of the story was not altered although the same words were not always used as found in the story. Students were faced with an anomaly and had to generate hypotheses about how to express the meaning of the story through drama and then deduce from those hypotheses specific decisions about characters. They first developed a general idea of how to dramatize the story and then had to deduce the specific ideas necessary to carry out the general idea. Following the first dramatization, the teacher and students discussed how well the story had been interpreted and then another group acted out the story followed by more discussion to review what had been accomplished. The students were testing out their ideas through induction by both dramatizing the story and discussing the resulting interpretations.

Wittrock and Linden (1981) used a strategy that involved students generating associations between the text and their experiences and between the different parts of the text. Students were asked to generate text-relevant images, illustrations, analogies, metaphors or summaries as they read stories on different days. They were then tested using a multiple-choice test of factual information and completion tests of reading comprehension.

The strategies introduced to the students would seem to be generative in relation to the three components of critical thinking, especially in relation to abduction. However, the measures used to assess this treatment do not measure this effect on reasoning but instead look at a literal level of recall.

ANALOGIES AND METAPHORS

This category contains studies which look at the effect of metaphors or analogies on reading comprehension. In the only instructional study identified in this category to date, Hayes and Tierney (1982) attempted to help students build a bridge between the knowledge they already possessed and new information. Students were presented analogous information in a passage on a related topic or in a passage that specifically drew an analogy between the old and new information. The provision of analogies was helpful to students as was a passage related to the new information but which did not contain specific analogies. Building background through presenting information related to the topic to be learned influenced students' comprehension and learning from text.

Peirce saw analogies as an example of critical thinking that involves all three components of the reasoning process. Involving students in using analogies during reading can thus be seen as a good way to get them actively involved in critical thinking. Hayes and Tierney point out that analogies allow the reader to transfer the properties of the known ideas to the new knowledge and create new knowledge structures which are linked to the old structures.

Crafton (1981) also looked at how one piece of text can support another text. Students read two expository texts in one sitting. In one group, the two texts were conceptually related and in the other group, the two texts were conceptually unrelated. The findings of the study indicated that reading was an experience which made available background information for use during another reading encounter. Students who read the conceptually related texts comprehended the material at higher levels, focused on the meaning of the texts to a greater degree, and were more active during the reading process than subjects who did not read conceptually related materials. This strategy suggests that having students read related texts will facilitate their ability to generate hypothesis and deduce possible predictions to be tested out during reading. This study is also a good example of the use of dependent measures which were based on a more open view of langauge and which did not measure the comprehension of students against only the researcher's interpretation of the written text.

IMPLICATIONS FOR TEACHERS AND RESEARCHERS

Peirce defined critical thinking as thinking that involves an attempt to try and match what a person thinks with what actually exists. It involves inferring the truth of something. This chapter attempted to use Peirce's definition of the three components of critical thinking - abduction, deduction, and induction - to provide a new lens for examining reading comprehension and to see if comprehension strategies in current instructional research were aimed at getting students to use reading as a critical thinking process. A number of major concerns emerge from the use of this new lens that both teachers and researchers need to take into account.

An examination of instructional strategies in reading comprehension research revealed that frequently the teacher is the person who benefits from active reasoning during these strategies. The generation of hypotheses is usually done by the teacher and not by the students. Often only one aspect of the three components of the critical thinking cycle proposed by Peirce was included in an instructional strategy and usually the process of abduction was omitted. Thus students were not involved in the one component of critical thinking which can originate new ideas. Peirce emphasized the interdependency of these three components of critical thinking and yet few strategies used that interdependency but simply taught inductive or deductive reasoning separate from the rest of the cycle.

Critical thinking involves generating and then testing out an hypothesis or rule. Many of the instructional strategies involved simply having the reader apply the rule. The rule was a given and was not being tested out. The reader was to take what he/she knew and use it. Other strategies operated at a literal recall level where the reader was simply to use memory to tell what he/she knew. In neither case was there an involvement of the reader in critical thinking through examining ideas.

In research where the strategies did involve critical thinking, often the critical thinking was not measured. Comprehension was usually assessed in such a way that the generative nature of abductive reasoning was denied. Strategies such as imaging or inferencing which involved abduction were tested as if they were deductive instead. These comprehension assessment measures tended to take a closed view of language where the readers' interpretation of the passage had to match the researcher's interpretation. There is a tremendous need in the field of reading education for better assessment measures which are more open-ended and measure the generativeness of thinking.

There were some promising strategies in these studies which offer teachers insights into how they might teach critical thinking strategies in the classroom, especially in inferencing and transmediation. Each of the three components of critical thinking accomplishes different things and encourages different types of thinking. In order to accomplish the different purposes of thinking, a reader needs to be able to use all three components of critical thinking and so teachers need help finding ways to develop the entire cycle of critical thinking in their classrooms.

While some help is available in instructional research in reading comprehension, most of the instructional research currently available to teachers do not provide them with sources of strategies they can use to enhance critical thinking. The lack of instructional strategies in reading comprehension research that enhances critical thinking and reading has several implications for teachers and researchers.

Teachers need to be critical thinkers themselves as they read research in order to evaluate whether the strategies utilized in treatments do enhance critical thinking. They also need to become their own developers of curriculum that supports the critical thinking and reading processes of their students. The example from the first grade classroom at the beginning of this chapter would seem to indicate that if children are in a classroom where they are allowed to develop their own interpretations of texts, rather than having to answer specific questions designed to make sure that their interpretations match the teacher's, they more actively and critically engaged in reading that text. Students need to be placed in situations where they face some type of surprise or anomaly which they must deal with such as in the "Sketch to Stretch" strategy described earlier. Teachers in the past have operated under the assumption that giving students a generalization or rule on how to proceed was helpful to students but Peirce's discussion of critical thinking helps us to now see that it inhibits critical thinking and so restricts reading to a process of dealing with unexamined ideas. Students as well as teachers need to be critical thinkers and generate hypotheses to test out.

Teachers and researchers need to reexamine the types of instructional strategies they are currently studying and the theoretical base of these strategies based on the concerns raised in this chapter. They need to study strategies where students generate and test out hypotheses rather than simply applying a given rule handed to them by the researcher or teacher. A major concern which teachers and researchers need to deal with is how to go about measuring the effectiveness of strategies so that the generativeness of critical thinking is not lost. The current practice of measuring effectiveness by matching the students' interpretations of a text against the researcher's own "correct" model has limited the types of strategies which have been utilized as a treatment and has resulted in producing findings which do not measure the critical thinking involved in strategies which had the potential of enhancing critical thinking. Teachers and researchers need to closely examine studies which have taken a more open view of langauge and attempt to continue to develop assessment measures which are based on this view of language.

CONCLUSION

A major source of concern about comprehension instruction and instruction in schools in general is that education does not encourage students to doubt the rule or an authority's ideas. Students are to take a rule or idea as a given and apply it exactly as it was handed to them rather than to test it out. Measurement and assessment techniques also encourage students to not doubt the rule or idea. Peirce demonstrated that generating and testing out rules or hypotheses is how the critical thinking process occurs. The lack of opportunity for this in many classrooms and schools is cause for great concern if we truly want schools to be places of learning and thinking and reading to be seen as a critical thinking process.

Chapter 8 will take a different perspective on the kinds of implications for instruction we found in current reading comprehension research. This chapter will take you on a guided tour of the landmarks of the landscape, the instructional studies which were identified as exemplary.

Chapter 8

LANDMARKS OF COMPREHENSION INSTRUCTION: EXEMPLARY STUDIES FOR TEACHERS TO USE

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INTRODUCTION

A team of researchers whose task was to read and analyze the body of reading comprehension research from the past ten years was meeting to discuss studies. Each researcher was considering a synthesis paper that looked at some important aspect of reading comprehension. The table was stacked high with studies being categorized and considered. The team, working together as they had for so many afternoons, was ready to discuss whatever topics seemed important.

> Looking at the stacks, I sighed, "You know, what I'd really like to write about is classroom instruction. I'd like to synthesize the exemplary studies for teachers."
>
> "Fine," said Diane, "but how would you choose exemplary studies - what guidelines would you use?"
>
> "Well, first the studies need to have a significant bearing on the classroom, on what is actually going on during instruction," I asserted.
>
> "A lot of the studies we've read are more designed to answer the researcher's questions than get at actual classroom instruction," said Sharon looking up from her writing.
>
> "But there are some studies which deal with classroom settings more than others," I answered.
>
> Sharon put her writing aside, "Most of the studies we've read involve such small amounts of time in actual instruction, ... wouldn't it be important to choose studies with instruction carried out over extended periods of time?"
>
> "Yes, but there are studies with short duration which have important ideas," I said.

"Let's try this," said Diane grabbing a piece of chalk, "I'll write the criteria on the board and let's see what you think."

- — Significant bearing on classroom instruction
- — Extended period of time in the classroom

I thought for a moment and added, "I would like the instructional activities to increase students' interest and involvement."

Diane added 'Increase students' interest and involvement' to the emerging list and then paused to consider the set as a whole.

- -- Significant bearing on classroom instruction
- — Extended period of time in the classroom
- -- Increase students' interest and involvement

Just then Barbara, a teacher who had recently joined our research team, walked in. We informed her of what we were doing, and she joined our discussion.

"I like the idea of including studies that increase students' interest and involvement, but I think studies with 'significant bearing on classroom' is too broad. 'Amount and kind of instruction' might be more specific."

"Why do you think so?" I asked.

"I think teachers need to know the amount and kinds of comprehension activities going on in classrooms in order to reflect on their own instruction to see if what they are really doing is focusing on reading comprehension."

"That seems like a better guideline because Barbara is concerned with what can potentially happen in classrooms rather than just with what happened in the research studies," I thought out loud.

Diane proceeded to start the list again.

- — Amount and kind of instruction
- — Increase students' interest and involvement

"How can teachers best increase students' interest and involvement?" challenged Diane.

"I always try to make the best use of the experiences and resources which my students already have," added Barbara.

"That's it. I need studies which encourage learners to use their prior experiences in relating to the text."

Diane seemed to realize that I was satisfied and completed the list.

-- Amount and kind of instruction
-- Increase students' interest and involvement
-- Encourage students to use prior experiences

"Why don't you and Barbara work on the paper together?" suggested Diane.

"Then teachers would certainly get a teacher-researcher perspective," offered Sharon.

"That sounds like a great idea," I added, "But before I had time to ask Barbara, she started to say....

"I've been a classroom teacher for five years and a special education resource teacher for eight years, but I've never worked on a research project before. Do you think I'm ready for this?"

We all assured her that she had much to offer, and before the meeting was over Barbara and I had agreed to work together on the synthesis paper of exemplary studies for teachers.

Thus we attempted to choose the reading comprehension exemplary studies with the following guidelines: (1) amount and kind of instruction; (2) increase students' interest and involvement; and (3) encourage students to use prior experiences. However, we immediately realized that many studies fit all three criteria. Nevertheless, because these categories proved used useful in our discussions, we decided to keep them. We invite you to be flexible in changing the grouping of these studies to suit your needs in various situations. To assist you, we have provided preview summary tables before discussion of the studies. You might like to put certain studies in all three major tables which we have constructed, and/or create new charts and tables which help you see quickly and easily landmarks in the current state of reading comprehension instruction. Our comprehension research suggests that the creation of such previews, summaries and visuals make text more comprehensible.

AMOUNT AND KIND OF INSTRUCTION

It proved especially useful to look at the amount and kind of instruction. We hope to demonstrate that: (1) too often the evaluation becomes the instruction, leaving little time for actual reading comprehension instruction; (2) there is a need to make use of prior experiences and social-cultural patterns of learners; and (3) there are interesting ways to vary traditional basal reading activities. Studies which will be discussed in this section are summarized as follows:

Table 1
Exemplary Studies

Author	Amount and Kind of Comprehension Instruction
Durkin (1979)	Little time on instruction because teachers were attending to assessment and worksheets
Leinhardt, et al. (1981)	Little time on instruction of learning-disabled because too much time on nonreading activities
Mason (1983)	Lessons omitted introductions and discussions; reading, writing, and subject matter activities that follow direct instruction were not substantial
Tharp (1982)	Maximum comprehension instruction using learning stations and adapting to the social-cultural patterns of learners in the KEEP Program
Au & Mason (1981)	Adapting instruction to fit the social-cultural patterns of learners
Wixson, Yochum & Bosky (1984)	Revised basal activities which focus on concept development; predicting relationships between key concepts and story content; and inferential reasoning

Current Amount and Kind of Instruction

Durkin (1979), Leinhardt, Zigmond, Cooley (1981), and Mason (1983) looked at the amount and kind of comprehension instruction currently existing in classrooms. They all suggest the need for more actual comprehension instruction.

Both Durkin (1979) and Leinhardt et al. (1981) held that time spent in instruction was critical to achievement. Durkin concluded after extensive classroom observation that little comprehension instruction actually took place; teachers were instead attending to assessment of comprehension and administration of written worksheets. Leinhardt et al., looking at elementary classrooms for the learning-disabled, found a similar pattern: students engaged in many nonreading activities during reading time. Both recommended that teachers increase the amount of direct reading comprehension instruction.

Mason (1983) observed classrooms in order to find whether a typical sequence of instruction existed and found that few classrooms lessons contained complete text-related sequences (introduction, reading, and discussion). Instead, teachers omitted either the introduction or discussion and substituted other events unrelated to the text. Mason suggested that alternative activities for independent work could include learning stations offering significant reading, writing and subject matter activities.

Clearly, the recommendations from these three studies suggest that teachers need to shift from assessment and work-sheet dominated comprehension activities to emphasis on direct instruction of comprehension for all children. These findings made us both very reflective. Barbara admitted that in the past she had fallen into the trap of the teachers in these studies and had not planned much for actual comprehension instruction. We both reflected on the fact that members of our research team who are currently out observing in schools had recently informed us that in some special education classrooms the evaluative instruments have become the curriculum. That is because of the lack of better alternatives, teachers sometimes use them as guides for instruction. We are finding that there are many better alternatives for reading comprehension instruction which the remaining studies in this paper offer teachers.

Maximum Comprehension Instruction

Interestingly, the recommendations made in the above studies for significant amounts of time spent in actual comprehension instruction and improvement of activities through learning stations are landmarks of the next study by Tharp (1982). Both Tharp (1982) and Au & Mason (1981) stress the importance of prior experiences and social- cultural patterns of learners in instruction.

Tharp (1982) discusses the KEEP program in which time allocations are designed to provide a maximum amount of direct comprehension instruction for small groups while other students work at 10-12 learning stations. The KEEP program monitors the amount of time spent on comprehension instruction daily. Teachers use ETR (experience, text, relationship) sequences to guide lessons:

E The teacher introduces content drawn from the child's experience.

T Text material is then read.

R Discussion is conducted to establish relationships between the child's experience and the text.

There is heavy reliance on questioning at various cognitive levels and the participation structures which fit social cultural-patterns of learners are informal, allowing learners to contribute to one another's answers and generate group rather than individual responses. The KEEP Program thus incorporates the following elements: active instruction of comprehension (nearly 66% of face-to-face instructional time devoted to comprehension), classroom instruction in small groups (with multiple participation during ETR sequences), and independent prescriptive work in learning centers.

We both agreed that the major landmarks of the KEEP Program were: (1) the amount of actual time spent on comprehension instruction; (2) the learning station concept which provided an excellent example of how to make independent work meaningful; and (3) the planning for instruction around prior experiences and social-cultural patterns of the learners. This program's adaptation of instruction to the social-cultural patterns of the learners further confirms earlier findings of Au and Mason (1981). They compared the school achievement of students receiving instruction where students wait to be called on to speak one at a time with patterns allowing students to share turns in joint performance (common in their Hawaiian culture). Achievement was much higher when social-organizational factors fitted the cultural patterns of learners. They concluded that any kind of instruction should balance interactional rights between teacher and children.

Revised Basal Activities

While Tharp's (1982) KEEP Program is an exemplary study, Barbara felt that the three strands of instruction (comprehension, sight vocabulary and decoding) could be improved because this kind of instruction was too much like many standard basal activities which do not encourage enough higher level thinking. I suggested that the Wixson, Yochum and Bosky (1984) study should prove most useful to teachers. As Short (chapter 7) has demonstrated, their revised basal activites engage students in the three important components of critical thinking.

Wixson, Yochum & Bosky (1984) contrasted two approaches — standard basal activities and revised basal instruction. A description of these two approaches follows:

Table 2

Traditional versus Untraditional Approaches to Reading Comprehension

Standard Basal Activities	Revised Basal Activities
Prereading vocabulary:	
Teacher introduced words in sentences written on the board.	Students identified critical attributes of essential concepts, providing examples and non-examples.
Guided reading:	
Teacher introduced a general purpose-setting question and students read silently. Later, the questions after reading were answered by rereading story sections orally.	Students generated predictions about each vocabulary word's relation to the story. The written predictions were evaluated for accuracy after silent reading.

Follow-up:

Worksheet on skill development (sequential order of events) was completed.	Reasoning guides were completed in which students labeled inferential statements as accuate or inaccurate and provided supportive story information for their judgment.

Based on the responses of students to free-recall and open-ended questions, these researchers concluded that the kind of instructional activities that accompany basal lessons shape the nature of resulting story comprehension. Both kinds of instruction facilitated comprehension, but revised basal activities produced significantly higher quality responses to comprehension questions and more focus on central story information. Thus, instruction which focused on concept development, predicting relationships between key concepts and story content, and inferential reasoning was shown to enhance children's comprehension beyond the level achieved with traditional activities.

We both noted that the findings of Wixson, Yochum and Bosky further confirm the need to rethink comprehension instruction. We were not surprised that the revised basal activites produced higher quality responses because each of the three activities comprising the lesson format focused on critical thinking through active student involvement.

In the first revised basal activity, the teacher had students identify critical attributes of essential concepts and provide examples and non-examples. In the next revised basal activity, the teacher encouraged higher level thinking by having the students generate predictions about each vocabulary word's use in the story and to use these predictions to evaluate for accuracy after silent reading. In the third revised activity, the students demonstrated their ability to label inferential statements as accurate or inaccurate by providing supportive story information.

These activities stand in contrast to the standard basal activities reported in Table 2 which appear to be similar to what Durkin (1979), Leinhardt et al. (1981) and Mason (1983) report in Table 1 as the more general kinds of activites that have been going on during reading instruction. In none of these more traditional activities are students encouraged to generate their own responses.

This set of studies made us realize that many traditional reading comprehension activities do not increase students' interest in the content area and involvement in critical thinking. As a result we were more motivated than ever to find useful studies for teachers which offered alternative activites which increase students' interest and involvement.

Need for Reflection

Before we move on to the next studies, we would like to present you with questions which resulted from our reflections on the studies we have reported. They are designed to increase your interest and involvment in the teaching of reading comprehension in your classroom.

1. Are you spending enough time on actual reading comprehension instruction?
2. Are children labeled special education in need of different comprehension instruction than other children?
3. Are children labeled special education given even more nonreading activities than other children during instruction?
4. Given what we know about the process of reading comprehension, are children's labels useful for planning appropriate instruction? Aren't all children special in that they come to us with unique prior experiences and social-cultural backgrounds?
5. Won't these unique prior experieces mean that different activities may increase interest and involvement for different students?
6. Have you thought about setting up learning stations to help deal with these unique needs?
7. What kinds of reading, writing, and conceptually-related topic invitations might you extend to students at such learning stations?
8. Do you plan instruction that encourages creative thinking and inferential reasoning?
9. Do you plan instruction such that learners are actively engaged in learning through doing?
10. Do you plan instruction which encourages social interactions among learners?

We hope your responses to the above questions will enable you to better make use of the studies in the remainder of this paper. Barbara's responses have certainly done this for her. She is eagar to get back to Glooscap Elementary School to try out some of the interesting drama, art, preview, summary, analogy, and metaphor activities presented.

INCREASE STUDENTS' INTEREST AND INVOLVEMENT

Since most of the studies which encouraged students to use prior experiences also increased students' interest and involvement, any study in this group could have just as easily fit in the next section of this paper. We will present but an example of the more activity-oriented studies in the hope that they will spark you to expand on and/or create even more interesting comprehension activities. We hope to demonstrate that: (1) reading comprehension is much more than answering questions at the end of a passage; (2) there are many modes of expression and subject areas besides reading which enhance reading comprehension; (3) if learners are going to use effective comprehending strategies, they need opportunities to engage in social situations in which they discuss, seek meaning, and solve problems; (4) structured overviews, previews, and flow charts are useful comprehension activities; and (5) there are different kinds and ways to use summaries to enhance comprehension. Studies which will be discused in this section are summarized as follows:

Table 3
Exemplary Studies

Author	Activities to Increase Students' Interest and Involvement
Linden & Wittrock (1981)	Combination of generative activities including drawing and naming images, writing summary sentences, and thinking of metaphors and analogies
Henderson & Shanker (1978)	Drama as response to literature
Szabo & Lameill-Landy (1981)	TV as motivational device
Lesgold, McCormick & Golinkoff (1975)	Learners draw stick figure cartoons to recall and retell stories.
Sampson, Valmont & Van Allen (1982)	Instructional cloze with students verbalizing their thinking
Cohen & Stover (1981)	Students alter math word problems to make the problems more comprehensible
Taylor (1982)	Important ideas summarized in in each paragraph, then written into outline form before inclusion in a more complete summary
Graves, Cook & LaBerge (1983)	Extended story previews prior to reading thus serve as motivational devices
Geva (1983)	Constructing flow charts for more careful reading of expository text
Winograd (1983)	Identifying important elements in text and summarizing
Hare & Borchardt	Summarizing rules

Multi-modal Processing

Yesterday Barbara interviewed a teacher whom she will observe teaching reading comprehension. The teacher suggested that her major approach to reading comprehension instruction was through asking questions at the end of passages to assess whether her students had read and understood. This further confirmed the findings of Durkin (1979) and others and made Barbara even more reflective. She admitted to me that in the past she, too, had spent too much time asking children questions to see if they had appeared to have read and understood. At the end of the interview, this teacher did express a desire to be able to read the results of our reading comprehension research. We feel sure that when she does, she will see that Linden & Wittrock (1981) and others suggest many interesting alternatives to the traditional approaches which she has been using.

As an alternate to answering comprehension questions at the end of a passage, Linden and Wittrock (1981) studied generative comprehension techniques that occur during and after reading. Their premise was that comprehension is enhanced when learners build relationships between text and their prior knowledge. They confirmed our initial discussion with the research team about the need to use prior experiences to increase students' interest and involvement. They suggested a number of strategies to induce readers to attend to text, relate knowledge and experience to it and build associations, abstrations, and inferences. These strategies included generating text-relevant images, illustrations, analogies, metaphors and summary sentences. A program combining these strategies was compared with a traditional one in which students simply read text selections and answered questions. The combination program involved the following generative activities for a succession of stories:

> Day 1 -- Immediately after reading a story, students generated, illustrated, and named images for the story. The imaging instruction directed students to make pictures in their minds of everything in the story.
>
> Day 2 -- Students composed summary sentences as they read a second story. They considered the story in sections and wrote one or two sentences for each part.
>
> Day 3 -- Students generated and wrote metaphors and analogies as they read a third story, making connections between the story and their own experiences.

Responses on story-centered comprehension tests indicated that learners in the generative learning program produced more text-related associations and demonstrated increased retention of facts and comprehension of stories. Thus it appears that such innovative activities as imaging, drawing, analogies and metaphors have much potential for making comprehension instruction more effective. Various authors throughout this volume deal with studies which are examples of similar interesting modes of expression to enhance comprehension. For example, Snyder (chapter 10) and Harste (chapter 12) mention a study by Siegel in which the children recast their their understandings through sketching. The studies by Henderson & Shanker (1978), Szabo & Lamiell-Landy (1981) and Lesgold, McCormick, & Golinkoff (1975) are but a few examples of research studies which increase students' interest and involvement through alternative modes of expression.

Henderson and Shanker (1978) used creative dramatics as an alternative to basal reader workbook activities to increase comprehension of second graders. They used interpretive drama to lend interest to basal reader stories. Their procedure was to hold a pre-drama discussion in which students determined who the characters were and what their roles entailed; then students played out the drama improvising lines and actions as other students served as directors, makers of sound effects, and prompters. A discussion of whether critical elements of the story were interpreted well enough was followed by successive performances until everyone had participated. The researchers found significant differences in favor of the interpretative drama over basal reader workbook activies. Moreover the children preferred the drama. We feel that this is understandable because the children were actively engaged in a social situation in which they had opportunites to talk about their problems as they attempted to solve them.

Szabo & Lamiell-Landy (1981) used television scripts of not-yet-broadcast prime time television programs as supplemental high interest comprehension materials. Over a period of one year, scripts from Mork and Mindy, Happy Days and Eight is Enough were used along with companion comprehension exercises. In this case, interesting material promoted increased attention and more active participation. In addition, students benefited from additional exposure to story lines in rehearsals and subsequent program viewing. The authors have suggested that viewing popular television shows offers the potential to stimulate a wealth of visual imagery which then can be reinforced upon subsequent reading of the script. Thus it appears that the use of television scripts may prove useful for comprehension after children have already viewed programs. Such scripts also have excellent potential for dramatizing, and other social interactions among students and teachers.

Learning Is Social And Must Make Sense

Based on the observations which our research team have being doing in special education classes, there does not appear to be enough opportunities for children to engage in social situations which give them opportunities to talk about their problems and attempt to come to better understandings. Today, when Barbara was out in the schools observing reading comprehension instruction in special education classes, she noted that most of the instruction was individual. From the following example which Barbara related to me, it seems clear there is a need for more social interactions among learners:

> "This teacher seemed to read with children individually, discuss the stories and ask questions. When I asked the teacher if she always did reading in turns with these eight children, she said that she did because they were each using different materials. So I asked her if she followed the same procedures with social studies. She said that she works with them as a group rather than individually in social studies. Because I feel that learning is very social, I asked if I

> could observe her teaching social studies."

Through very good intentions on the part of the teacher to meet individual needs, she may be cutting children off from some very worthwhile learning experiences. We feel sure that this teacher will be very interested in trying some of the above ideas and we hope to discuss them with her throughout the course of this research project.

It seems that children need opportunities to learn collaboratively if they are going to come to value and use strategies. Lesgold, McCormick, and Golinkoff (1975) suggest the potential of illustrating story events for improved comprehesnion, but the students in their study did not appear to come to value the strategy. They drew stick-figure cartoons to illustrate story events. The resulting cartoons focused on information from each sentence, showed events from each paragraph, and prompted recall of story events. Students participating in extended imaging instructions of this sort increased attention to details and main ideas in subsequent paraphrase recall tasks. However, these students did not use imaging when not explicitly directed to do so. Yet, Short (chapter 7) suggests that imaging facilitates critical thinking.

Barbara tried to get her special education children to value strategies and found it to be a very worthwhile challenge for her. She had the most success encouraging students to value "making sense" strategies when using her students as informants. She first tried to find out as much as possible about them in order to best know when and how to support each learner. The following example illustrates how Greg came to value "making sense":

> Barbara begain by examining Greg's cumulative records. Because he had repeated grades one and three, he was in the fifth grade at the time she began to work with him.
>
> After his first year in grade one, his teacher suggested that he was a good thinker but he had to get a better foundation. After his second year in grade one, his teacher said that he was attentive and had used his language arts skills. His grade two teacher reported that he did fairly well in language arts skills but that his comprehension was weak. By his first year in grade three both his language arts skills and his comprehension were reported to be weak. After his second year in grade three, his teacher reported that he had gained in oral reading and comprehension, but still benefited from a controlled vocabulary. His fourth grade teacher reported that he had very poor phonetic skills but a good understanding for oral vocabulary.
>
> Barbara decided to help Greg take a more active involvement in reading by redirecting his orientation to print. A major activity which she used a cloze reading strategy which is a variation of the Sampson, Valmont & Van Allen (1982) classroom cloze instructional center. Their quasi-cloze lessons focused on the structure of language. Discussions explored the various answers that could be accepted. Students described their own reasons for particular word choices. This verbalization of student thinking heightened student awareness of the language constraints surrounding each blank and contributed to the success of this instructional approach.

The cloze procedure used by Sampson and his colleagues does not duplicate the reading process. Because readers are encouraged to focus on surface structures by filling in gaps which they have not created, Barbara developed cloze reading strategies using Greg and other students as her informants (Roberts, 1984). When using her cloze reading strategies, readers create the gaps by identifying unfamiliar text and attempt to fill in only the gaps which are important for getting meaning in terms of their reading purpose.

After working with Greg for a half hour per day three times a week, Barbara asked Greg what he thought about cloze reading strategies and other meaning-seeking activitities which they had been using. He said, "Before this year, I thought learning to read was learning vowels, beginnings, endings and how to decide the word so you can say it right....Some teachers just taught you the first thing, and told you it, and expected you to keep a hold of it till the rest of the year." Greg went on to explain that he never focused upon trying to make sense before.

The lessons Greg learned from his previous school experiences about reading comprehension are not surprising. From the beginning of his school experience he had been confronted with fragments of language rather than whole stories and texts to read. The most rewarding thing about this example is that Greg did come to revalue more functional strategies. "Now, when I keep practicing reading, I can read better."

He discussed and talked about this strategy so much that when other chidren used the strategy, they often said that they were using 'Greg's Strategy.' Greg's growth led other children to grow.

Text Structure

Besides coming to better understand potential tasks, the reading process, and readers, teachers will find it most useful to make use of text structure in planning for comprehension instruction. Considerable research evidence indicates that sensitivity to text structure is a major contributor not only to text comprehension but text production. That is, sensitivity to text structure can enhance understanding through both reading and writing. Barbara and I have both found that our understanding of reading comprehension has been greatly enhanced through our discussions and the writing of this paper. For example, each time we made structural changes in the paper, we seemed to increase our understanding of reading comprehension as well as writing strategies.

Cohen and Stover (1981) have demonstrated that students can change the structure of math word problems to make them easier to understand. Snyder (chapter 10) found this study so impressive that she has reported on it in detail. Cohen and Stover recognized that word problems in mathematics often pose comprehension problems. They set gifted students to the task of simplifying them. Among the twenty-three elements which students later revised were the order of problem elements (students arranged numbers in the order required for appropriate solutions), the presence of extraneous information, and the absence of diagrams. Regular students working the revised word problems were markedly more successfull than they had been with the same problems in their original formats.

The obvious next step was to teach these regular students to do this kind of analysis and simplication themselves, thus increasing their own comprehension. Rather than generating their own ways to make the problems easier, students were told to see if they could eliminate extra information, reorder the numbers or add diagrams. Some practice on each technique was provided and students applied their new comprehension strategy to math test problems. This simple instructional program yielded substantial gains and indicated that visualizing verbal information and learning to tease out the message are essential elements in the comprehension process. Short (chapter 7) suggested that the regular students were not as intellectually challenged as were the gifted students. We feel that all students should be given this challenge because students have unique experiences which may cause them to make the problems easier in a wide variety of ways. In addition students like to work together and may come up with even better strategies through sharing ideas. This study suggests that students can help design and model instructional materials and that teachers need to be concerned with comprehension in all subject areas.

Taylor (1982) explored instructional strategies that used the structure of expository health texts to increase reading comprehension. Taylor taught students to read and develop a skeleton outline that would represent the structure of the text. Every subsection and paragraph was represented by a heading or main idea statement. Once the skeleton outlines matched the text, summaries were written from them and students discussed the text and their summaries in class. Students participating in these activities learned to talk about the structure of the text and use it in fashioning their own summaries. This instructional program increased memory for text and sensitivity to the structure of expository texts.

Graves, Cooke and LaBerge (1983) increased memory for text through instruction with story previews prior to reading. The researchers found that low ability junior high students using previews responded significantly better to short answer questions than students not receiving them. Unlike the typical brief story previews commonly given before reading, these were more substantial and functioned as extensive motivational devices. The authors describe them as follows:

> Each preview began with a series of short questions and statements designed to catch the students' interest, provide a link between a familiar topic and the topic of the story, and encourage active involvement in a brief class discussion related to the theme and topics of the story. This was followed by a synopsis of the story. The setting was described, the characters were introduced, the point of view was specified, and the plot was described up to the point of the climax. Next, the characters' names were repeated along with a brief statement identifying each of them. Finally, three or four

> difficult words were briefly defined. Each preview was about 600 words long. (p.266)

Students receiving previews recalled slightly more than twice as much information as students who simply read the short stories.

Rather than provide previews, Geva (1983) had learners construct flow charts to represent content and structure. Students studied the function of various structures, called TUF's (Text Unit Functions) and provided instruction in seeing text in terms of content and relations among components. These relations included statements of topic, elaboration, cause-effect, process, example, detail, and conclusion. The flow charting strategy led to more careful reading of expository texts and was more effective for less skilled readers.

Text production was the other focus of the text structure research. Winograd (1983) and Hare & Borchardt (1983) looked at instruction in summarizing as a way of increasing reading comprehension. Winograd (1983) reasoned that sensitivity to importance among ideas in text related to ability to comprehend. Instruction focused on learning to identify important elements of a text and transform the meaning of a full text into its gist. When students rated the relative importance of each text sentence, differences between good and poor readers were evident; poor readers were less able to choose important elements of the text, often choosing, instead, elements that were novel or of particular personal interest. Poor readers were hindered by their lack of sensitivity to important elements. This factor was found to account for a considerable part of the difficulties in comprehension that were experienced by poor readers. Hare and Borchardt (1983) compared inductive and deductive instruction in summarization. Students were taught a series of specific summarization rules - to get rid of detail, collapse lists, etc. or to identify topic sentences in order to produce summaries. While neither approach was superior to the other, both increased students's ability to produce summaries.

It appears that there are many interesting things which teachers and students can do with text to make it more comprehensible. For example, they can alter it through diagrams, re-ordering, and leaving out extraneous information. They can also generate outlines, flowcharts, previews and summaries. Most of the text structure studies provide learners with steps for creating previews, summaries, etc. We feel that through reading, writing and using other communication systems in social situations,teachers and students can generate many interesting ways for making text more comprehensible.

Capsule of Potential Activities

It appears that there are many alternate approaches to the use of traditional passage questions for reading comprehension instruction. There are also many different variations of activities. We feel that the best variations encourage students to generate their own thinking through engaging in social transactions which involve problem solving. We hope the reflections which you have begun to make will help you and your students to use images, illustrations, metaphors, analogies, drama, TV, diagrams, cloze reading strategies, flowcharts, previews, summaries and other communication systems to enhance understanding.

Because knowledge, which learners already possess through prior experiences, is a valuable resource for any activity, the final section of this paper will deal with this aspect of comprehension.

ENCOURAGE STUDENTS TO USE PRIOR EXPERIENCES

Since most of the studies already presented encourage students to use prior experiences and Heine (chapter 9) deals extensively with background knowledge, we will deal with but an example of the many studies which emphasize such resources of the reader. We will suggest the potential use of: (1) prior knowledge; (2) inference awareness; and (3) knowledge sharing. Studies which will be discussed in this section are summarized as follows:

Table 4
Exemplary Studies

Author	Prior Knowledge & Inferencing
Gagne & Memory (1978)	Imaging instructions, providing background information,and citing familiar examples
Hayes and Tierney (1982)	Analogies activate prior knowledge
Marr and Gormley (1982)	Analogies to understand unfamilar text
Langer (1982)	Prior knowledge assessed and used for instructional purposes
Gordon	Inference awareness training
Carr, Dewitz & Patberg (1983)	Structured overview, modified cloze, and checklist for inferential reading
Hansen (1981)	Weaving metaphor for inferencing

Prior Knowledge

The first study which we will report on could have just as easily fit in the first section of this paper because Gagne and Memory (1978) tested the effectiveness of traditional prereading instructional techniques, comparing one against another for their effect on overall comprehension. However, we chose to put it here because the results focus on prior knowledge.

Gagne and Memory (1978) looked at five standard prereading approaches: (1) asking main idea questions before reading; (2) providing background knowledge; (3) instructing students to image as they read; (4) providing familiar examples; and (5) asking factual and application level prereading questions. The three approaches which were significantly more effective than others in enhancing overall comprehension were: (1) imaging instructions; (2) providing background information and (3) citing familiar examples. These approaches each encouraged learners to relate what they already knew to new information in the text that they were reading. In contrast, less effective practices (factual, main idea, and application level questions) focused the reader's attention on the text as the main source of information. Factual questions led students to read for factual information, and main idea questions did not improve overall comprehension.

Hayes & Tierney (1982) support the above findings. Through exposing learners to familiar and unfamiliar topics and measuring resulting comprehension, they found that prior knowledge is the major determinant of learning from text. Their data provided strong support for the activitation of general prior knowledge and modest support for the activation of specific knowledge related to a specific topic in text.

Marr & Gormley (1982) add further support for the use of prior knowledge. They suggest that prior knowledge is the strongest predictor of student ability to draw inferences and elaborate information and the factor which predicts most successfully student ability to fill in the informational gaps during reading. Readers with extensive prior knowledge of a topic can answer inferential level questions and are more apt to use information from their experience in answering higher level questions.

Perhaps an example of research on the effect of prior knowledge will make these findings more clear. Marr and Gormley (1982) investigated students' ability to comprehend passages on familiar and unfamiliar topics (familiar - baseball, mosquito, apple; unfamiliar - curling, aphid, and papaya). Prior knowledge of each topic was measured with questions posed before reading. Students read the passages, gave retellings, and answered probe questions. Interestingly, students who knew more about a topic told more about it in the course of responding to probes while their retellings stayed close to the text. Learners also seemed to use analogies to understand unfamiliar text. What they knew about one member of a category helped them grasp another.

Hayes and Tierney (1982) also found this same effect as they investigated how American readers knowing about baseball would understand the game of cricket. Critical factors became the students' knowledge of baseball and the provision of other instructional texts about either baseball or cricket. Students making analogies activated general knowledge that subsequently was used to understand unfamiliar text. In general, knowing more about one's world enables the reader to understand a range of topics and knowing about specific topics strongly influences comprehension of that and related texts.

The above research supports the value of discussion prior to reading, but leave us with two major questions: (1) How exactly are teachers to know when students are "ready" to read an unfamiliar text?, and (2) How are teachers to informally assess the amount of prior knowledge students bring to bear on any given reading experience?

As Hayes and Teirney have suggested, for certain purposes it may be more fruitful not to assess specific knowledge. The reader's general knowledge may be more useful. Then too, readers may want to find out if they would like to know more by reading about something unfamilar. Heine (chapter 9) deals with this issue, and to some extent we will deal with it in the final part of this section of our paper.

In relation to question two, we present Langer's (1982) study in which she attempts to assess prior knowledge for instructional purposes. We present this study in some detail as there are many times when teachers will find her Pre Reading Plan (PReP) extremely useful.

Langer's Pre Reading Plan (PReP) allows the teacher to determine students' prior knowledge about a specific topic, learn how that information is organized, learn what language students use to express their knowledge, and decide how much additional information needs to be taught before students are ready to learn from the text. Essentially PReP is a prereading discussion centering on an essential concept which proceeds in the following three phases:

> 1. Initial Associations with the Concept
>
> In this first phase the teacher says: "Tell anything that comes to mind when ... (you hear this word, see this picture, etc.)." As each student freely associates and tells what ideas initially came to mind, the teacher writes these responses on the board. During this phase, students have their first opportunity to make associations between the key concept and what they already know.
>
> 2. Reflections on Initial Associations
>
> During the second phase, the students are asked, "What made you think of ...(the response given by each of the students during phase 1)?" This phase encourages students to become aware of the associations they have made, to listen to each other's responses, and to become aware of their changing ideas. Through this procedure they gain the insight which permits them to evaluate the utility of these ideas in the reading experience.
>
> 3. Reformulation of Knowledge
>
> After each student has had an opportunity to think and tell about what triggered their ideas, the teacher asks, "Based on owr discussion, have you any new ideas about...(the word, the picture, etc.)?" This phase allows students to tell about associations which have been elaborated or changed as a result of the discussion. Because they have had a chance to probe their memories and evaluate their ideas in terms of the text, they will read and reformulate their ideas in light of the reading task. The responses elicited during phase 3 are often more refined than those elicited during phase 1. (p, 154-155)

This discussion serves as both an assessment and as an instructional activity benefiting both teacher and student. It is designed to help the teacher understand students' levels of knowledge and make planning of additional experiences easier. It also helps students call to mind their own knowledge and anticipate concepts in the forthcoming text.

Inferencing

Prior knowledge is a significant factor determining the quantity of inferences produced when students read. Studies on inferencing indicate that the critical factor is the connections learners make between their previous experience and text. Three studies which explored specific instructional strategies in inferencing and their effect on reading comprehension are Gordon (1980), Carr, Dewitz & Patberg (1983) and Hansen (1981).

Gordon (1980) compared a content and structure group with a group who received inference awareness training. The content and structure group received instruction in the content (background knowledge) pertinent to a passage before reading. The inference awareness group received instruction as to when and how to make inferences. Additionally, they received lessons describing and demonstating the reasoning strategies they needed to engage in to be successful.

While the inference awareness group was superior on total overall comprehension, the content and structure group was more successful with written summaries. This study suggests that learners need a variety of strategies and that comprehension strategies vary as a function of purpose. In view of Short's (chapter 7) discussion of Gordon's study, it appears that teachers may want to vary the inference awareness instructional procedures so that students can reason at higher levels to raise their own questions in coming to better understandings.

Carr, Dewitz & Patberg (1983) explored two combinations of strategies in attempting to increase inferential reading comprehension of expository passages. One group used a structured overview to activate background knowledge, a modified cloze to help integrate that knowledge with text information, and a self-monitoring checklist to help students monitor their thinking. The overview provided a hierarchical view of the reading material and provided a structure for assimilating new information. The cloze strategy was used to model and improve inferring and was monitored in the checklist. Questions on the checklist focused on whether answers made sense, fit with prior knowledge, and fit the context.

The second group relied solely on the cloze strategy with the checklist and omitted the structured overview. Both combinations produced significantly better inferential comprehension than the control group and neither was significantly better than the other. The cloze procedure was credited with providing students with a strategy for finding the information needed for answering inferential questions and the checklist was credited with enabling students to use this inferential skill in delayed transfer tests. While Carr et al. encourage readers to increase understanding through generating their own predictions, Short (chapter 7) suggests that one negative effect on critical thinking is the fact that their modified cloze emphasized finding one right answer for the blank. However, this can easily be overcome through using such cloze variations as Barbara suggested in the previous section of this paper.

Hansen (1981) investigated two instructional strategies using stories from basal readers as text material. In the first, students were given a steady diet of inferential questions; all those included in the teacher's manual and all that could be rewritten as inferential. Students read the stories and answered inferential questions. In the second treatment, children were taught to use a weaving metaphor for the process of connecting new information from stories with old information (prior knowledge). Strips of bright colored paper represented new information and hypotheses about the story were written on them by learners responding to teacher questions. Strips of gray paper represented existing knowledge and students wrote important information on them as teachers asked about their experience relative to the story. The idea was to demonstrate concretely how new and old information are woven together prior to and during reading. Learners, in fact, actually did weave these strips as they continued the process of learning more about the story using the two kinds of information. The results of these strategies were that both were effective in helping students draw inferences spontaneously. The weaving group experienced the most success in answering inferential questions in the classroom and the question group was most successful on standardized tests. Further discussion of this study can be found in chapter 10 by Snyder.

Knowledge Sharing

Barbara is working on expanding the weaving metaphor in order to get learners to share knowledge in social situations to enhance personal understandings. While Barbara has not yet had a chance to try this idea out with learners, she invites you to examine her current thinking to see if you may be interested in varying and continuing the following procedures:

1. Students write on a white file card all of the knowledge, experiences, and areas of expertise which they feel they know and would like to share with others.

2. Students write on a different color card the kinds of knowledge, experiences, and areas of expertise that they are interested in, but feel they need to know more about.

3. Students form themselves into groups of 4-6.

4. Each group discusses the information on their cards and ways they might share this information.

5. Each group reports on their discussions.

6. The teacher asks the class to sum up the major findings and reflect upon the value of the experience in which they have participated. [Insights into

reading comprehension such as the following should surface: (a) the need for sharing knowledge and experiences; (b) the need for sharing through reading, writing, art, music, drama, and other means of communicating; and (3) the need to be more conscious and reflective of their own learning experinces in order to help other learners.]

There is no limit to the number of interesting experiences which such a group of learners could pursue. It seems that such knowledge sharing should result in very worthwhile personal understandings because learners would be engaging in problem solving through a variety of communictation systems and social transactions. I suggested to Barbara that teachers may find it very useful to think about her knowledge sharing idea when reflecting on: (1) the questions presented at the end of the 'Amount and Kind of Instruction' section of this paper; (2) the social nature of learning and sense-making function of comprehension discussed in the 'Increase Students Interest and Involvement' section of this paper; as well as (3) the prior knowledge and inferencing discussed in this section.

SUMMARY

The studies which we have presented, while not including every important trend and investigation, present an example of interesting ideas which you may want to use in your classrooms. It certainly seems that the focus of comprehension instruction shapes the nature of students' comprehending. Comprehension instruction which makes use of prior knowledge and social-cultural patterns of learners is recommemded.

We feel that this instruction will be most effective when learners are engaged in social interactions which involved problem solving. Many instructional formats and strategies which you may want to engage in with learners have been presented throughout our paper. Activities using images, illustrations, metaphors, analogies, drama, TV, diagrams, cloze, flowcharts, previews, and summaries can be expanded and modified. Such activities need to build on students' existing knowledge, provide for extensive discussion, and place learners in active social interactions.

The most innovative trends in the research seem to be those which involve images, analogies and metaphors. Such comprehension instruction centers on using prior experiences, context, and moves to art, drama, and the like to increase reasoning abilities. We would like to suggest that both innovative and traditional activities can be very worthwhile when learners are actively engaged in various social situations.

CONCLUDING COMMENTS

We've decided to bring this paper to a close by discussing what working on it has done for both of us. Our brief dialogue may further aid you in your reflections on comprehension instruction which we have been suggesting throughout this paper. Below is the gist of our conversation:

> "Barbara, it seems that you use studies like these exemplary ones to help youself generate an overall perspective on comprehension instruction. You rejected some ideas, and modified other ideas, and you seem to be searching for ideas that may be useful in terms of your beliefs."
>
> "You're right, Karen, but the major thing which working on this paper has done for me is to make me reflective of my past teaching. The research has demonstrated to me that there are many alternatives to end-of-passage comprehension questions. I can't wait to get back to Glooscap Elementary School to really get the children engaged in using reading, writing and other activities suggested in these studies to enhance their understanding."
>
> "Speaking of writing, the actual writing and related discussions which we two have engaged in seems to support further what you have been suggesting about learning being social because I certainly have increased my understanding of comprehension instruction through working with you on this paper. I now have more of a feel for how this research can influence what's currently happening in classrooms.
>
> "Karen, the fact that I feel the same about our working together even further supports the need for such social learning. Through working on this paper with you, I've realized more than ever before that I need to read, write, discuss and do real life things with my students just as we have done. It was the actual engaging in our discussions and writing that was a very big factor in making these studies more comprehensible to me."
>
> "It seems that researchers and teachers need to think together about such issues as those we have raised in this paper. I hope more researchers make use of the thinking of teachers and what is going on in classrooms. Researchers and teachers need to think together."
>
> "That's very true, Karen. Our thinking together about these studies has certainly made me more reflective. I'm getting a clearer notion of what I believe are important activities and experiences for improving comprehension instruction."
>
> "Barbara, I hope other teachers will be as reflective as you when they read our paper."
>
> "Karen, I think our paper will help, but more importantly they will need to engage in comprehension activities with students and then reflect and share their understanings with researchers."

We invite you to take Barbara's last comment seriously. The experience which we have had is too valuable not to share with others. If teachers and researchers engage in such shared understandings, then not only comprehension instruction, but indeed all instruction will improve.

Chapter 9

READERS AS EXPLORERS: USING BACKGROUND KNOWLEDGE

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INTRODUCTION: A VISTA

Children do not come to school empty vessels ready to be filled with facts and skills. Quite the contrary, children come carrying a wealth of experiences that make up the foundations for what will be learned. This wealth of experiences has come to be referred to as background knowledge. This chapter examines current research on reader background knowledge as it relates to reading comprehension.

The current research is very clear that a reader's background knowledge is critical to the reading process. No reading event occurs without the reader tapping portions of this vast expanse of knowledge. Even the decisions that direct what background knowledge is to be accessed is dependent on the reader's background knowledge of the reading process. Because no two readers have the same personal history, no two readers have the same total background of knowledge. This makes an instance of reading a unique experience to every reader. If teachers and researchers are to better understand readers and reading they must consider the contribution a reader's background knowledge makes in comprehending text.

In the following section I define several types of background knowledge through a literacy experience of a preschooler. I then review the current research on each type of background knowledge. Next, I argue that future research and pedagogy need to consider a more complex conception of background knowledge along with the context in which reading takes place. And finally, I consider possible implications and suggestions for teachers and researchers.

MAPPING THE TERRAIN: WHAT IS BACKGROUND KNOWLEDGE?

To get a notion of what types of background knowledge a reader might bring to a reading event, let's look at a classroom scene where a preschooler, Mary, is getting acquainted with her classroom. Although by school standards Mary is not yet a reader, notice what she already knows about reading.

> Several weeks before Mary's first day of school she visited her kindergarten classroom. Mrs. Rossow, the kindergarten teacher, invited Mary to play in the playhouse corner of the room while she got acquainted with Mary's

> mother. In the playhouse area Mary surveyed the toys, the furniture and the books. Soon Mary was hard at work. First, she retrieved all the stuffed animals from the toy box. She arranged them on two pillows, leaning the animals together for support. Next, Mary went to the bookshelf and leafed through several books. Finding one that apparently met with her approval, Mary pressed her finger to each letter of the title as she recited the names of the letters. Mary returned to the play area announcing to the stuffed animals that she was going to read them a story about a seal. She told her stuffed animals that seals live in the zoo and that she saw some there. As an after thought she also ventured that she thought some lived in the ocean too. Sitting down cross-legged in front of the toys Mary opened the cover of the book, leafed through to the first page of the story and started 'reading'. Mary began with "Once upon a time," although the text on the first page did not. Like the illustrations, Mary's story included a seal and an elephant. Unlike the illustrations (or the text) Mary's story also included monkeys, giraffes, lions, tigers, and bears. Mary 'read' fluently, interrupting herself only occasionally by a giggle or a comment about her enjoyment of this story. As Mary turned from page to page she modified the story line in response to selected elements within the illustrations. In Mary's story animals talked and she used different voices to distinguish the characters. On the final page of the book Mary 'read' that all the animals were safely back in their cages just in time for dinner. Specifically attending to the text on the last page Mary swept her hand across the words as she read, 'The End.' Mary then closed the book, obviously pleased with her production, and asked the stuffed animals if they had enjoyed the story. After returning the book to the bookshelf, Mary kissed each of the stuffed animals, laid each down on its pillow, and she told them to be very quite. Mary tiptoed out of the playhouse area.

Although Mary had not received any formal literacy instruction, she demonstrated that she knew a great deal about reading. And what she already knew (her background knowledge) was used in creating this reading experience. Research on background knowledge and comprehension suggests four broad types of background knowledge that readers use. To get an understanding of these types of background knowledge, we will examine each of them in light of Mary's reading experience.

Content Knowledge. Knowing about the subject being read is crucial to reading comprehension. This can be seen in Mary's choice of a book about seals. She demonstrated that she recognized seals by the book she chose. She also related her own personal experience with seals and even speculated about less certain information when she said she thought seal also lived in the ocean. She relied on her prior knowledge about zoos to expand the meaning of her story beyond the illustrations in choosing other likely, but not represented, characters for her story including monkeys, giraffes, lions, tigers, and bears.

Structural Knowledge. Texts are structurally organized and Mary demonstrated that she was already familiar with one kind of structure - story grammar. Mary knew that her story had to follow a sequence that would logically conclude at the end of the book. Mary also showed us she was aware of the difference in language structure of a story to everyday language through her conventional "Once upon a time..." and use of dialog within the story. We know that Mary was also aware that books are structured with a title on the cover followed several pages later by the text which is partitioned across the remaining pages of the book. When readers are aware of the structures involved in language and print they can better predict what they well encounter. Mary demonstrated that she already knew many things about the structure of reading.

Process Knowledge. Reading involves many integrated processes and knowledge of those processes is essential to reading comprehension. On the broadest scale Mary demonstrated a process in orchestrating the entire reading event from identifying an audience, to selecting a book and reading it, to finally putting the stuffed animals to bed. Within the story itself, Mary constructed meaning guided by and responding to both the graphic information and to her own background of knowledge and expectations.

Pragmatic Knowledge. Mary knew much about the world and life in general and this knowledge was central to the decisions she made. Mary took on the personal stance of "mother" with which she seemed to be quite familiar. This initial decision set the framework for other decisions. Mary knew that mothers read to their children so she read to her's. In selecting a text about an animal she seemed to take into account the background knowledge of her audience. In telling her story Mary knew how to shift from being the story teller to being an elaborator or reactor to the story by interjecting her own comments and giggling. Knowing about life and about the multiple perspectives we take at any given time shaped Mary's reading experience and therefore shaped her reading comprehension.

Background knowledge is not the sole domain of the preschooler. All learners bring to bear what is currently known in creating new understandings. Older learners, unlike preschoolers, not only have more life experiences but also more formal educational experiences on which to draw in comprehending text.

Mary's reading episode demonstrates the types of background knowledge available to all readers. Each of these types of background knowledge have been the focus of research. In the next section of this chapter we will take a closer look at the research and the findings that addresses each of these types of background knowledge.

EXPLORING BACKGROUND KNOWLEDGE

Content Knowledge

Background knowledge involves content - information about the subject being addressed. Researchers who have explored content background knowledge have generally been interested in the link between the amount of background knowledge and reading comprehension.

How does content knowledge affect reading comprehension? Marr and Gromley (1982) had fourth graders read, recall, and answer probe questions about texts that were either familiar (baseball, mosquitos, and apples) or unfamiliar (curling, aphids, and papaya). They found that prior knowledge affected comprehension in three ways. First, specific knowledge about a topic supported learning more about that topic. Second, knowing about a related or parallel topic seemed to affect comprehension in the otherwise unknown topic. And third, general knowledge of the world improves comprehension on a specific topic.

Where do readers get knowledge of content? Ribovich (1979) reminds us that we take a risk if we assume that only formal "schooled" knowledge reflects useful prior knowledge for reading comprehension. Ribovich asked education students and economics students to read and retell from both education and economics texts. Before reading they predicted what concepts, ideas, or information were likely to be in the text (this was an assessment of background knowledge) and after reading they reported unexpected information they had encountered. The results from the economics text were predictable - economics students predicted more, remembered more, and listed more unexpected information than the education students. On the education text, however, both groups did about equally well, with the exception that the education students did predict more information than did the economics students. When we consider that the economics students have experienced thirteen to seventeen years of education it is reasonable to assume that they, like their education counterparts, have a wealth of background knowledge concerning education.

Does the quality of content knowledge affect reading comprehension? Researchers have also probed the effect of the quality of background knowledge. Holmes (1983) assessed the background of readers to be either (1) accurate, (2) inaccurate, (3) incomplete, or (4) missing. Holmes found that good and poor readers with little background knowledge comprehended about equally well, while good readers comprehended more than poor readers when they both had substantial background knowledge. Further, Holmes found that poor readers tended to rely on inaccurate background knowledge even when it was incompatible with the text. Good readers recognized the incompatibility. Lipson, (1982) like Holmes found that comprehension is enhanced by the amount of background knowledge possessed by the reader. She notes that readers were more likely to recall text information that was unknown to the reader than information that was known but counter to the text. These two studies suggest that although the quantity and quality of background knowledge is important to comprehension, the way that knowledge is used also affects a readers comprehension.

Other researchers have investigated the qualitative - quantitative nature of background knowledge. Langer and Nicolich (1981) used a free association technique asking readers to respond to several key content words with "anything that comes to mind." The responses were then categorized to reflect one of three levels of prior knowledge. Langer and Nicolich found that the qualitative level of prior knowledge was a strong predictor of recall. Hare (1982) using Langer's technique, however, found that a simple quantitative count of acceptable associations was a still better predictor than the weighted qualitative measure.

This research demonstrates the importance of content background knowledge. Perhaps more significantly it suggests that the quality of the knowledge and how that knowledge is used contributes to reading comprehension.

Structural Knowledge

Researchers have focused much attention on the knowledge structures or schema that readers bring to reading. Whaley (1981) found that even young readers can use their sense of story structure to comprehend text. Whaley demonstrated that children at the third, sixth, and eleventh grades could read stories that contained substantial blocks of missing text when the stories were of a familiar structure and the missing text represented one of Mandler and Johnson's (1977) story grammar text elements (i.e. setting, initiating event etc.). The reader's sense of text structure apparently provides sufficient organization to the story to predict the missing text. Dreher and Singer (1980) tried to teach story structure to fifth grade children. They prepared worksheets that outlined a story structure. Students were to write in the specific events of a story under each element of the story grammar. As Whaley found, the students may have already had tacit knowledge of the story structure because the training did not improve comprehension.

Where Whaley looked for universality across age groups in use of whole text narrative structures, Mosenthal (1979) investigated the match between various narrative paragraph structures and the reader's internal narrative schema. Mosenthal identified three possible types of schema for the theme of a paragraph - theme initial schema, theme-final schema, and no-theme-structure schema. Readers judged to use one of these three schema types or no theme schema at all were asked to read narrative paragraphs from each of the schema types. Mosenthal reports, that as predicted, readers recalled the most when their schema matched the text structure, and readers with theme schema recalled more that readers with no theme schema.

How do readers handle unfamiliar text structures? Kintsch and

Greene (1978) used a fairy tale and an Apache folk tale structure to explore readers use of familiar and unfamiliar text structures. Readers not familiar with Apache folk tales were asked to read both a fairy tale with a familiar structure to the readers and an Apache folk tale. After reading they were asked to write summaries immediately following the reading and again after varying passages of time. Kintsch and Green found that the readers wrote better summaries and consistently recalled a similar text over repeated recalls when they read the familiarly structured fairy tale. When reading the Apache folk tale, however, the readers introduced increasingly severe "distortions" of the plot during each of the several repeated retellings. The readers' knowledge of structure seemed to aid in both the initial recall and also in maintaining the story across time.

In what ways do text structures support comprehension and recall? Using expository text Taylor (1980) found that good and poor comprehenders seem to differ in the structure they use in recall. She had sixth graders recall a text immediately after reading and again two days following the reading of an expository text. While both good and poor comprehenders recalled equivalent information on the first recall, two days later the good readers recalled more of the text including more top-level structures than the poor readers. It appears that more of the text was remembered because the good readers had used a text structure that aided recall.

Is text structure only in the readers head? Anderson, Spiro, and Anderson (1978) found that the structure within the story can affect the recall of specific information within the text. Readers read one of two texts: one illustrated a restaurant schema and the other a supermarket schema. An identical list of food items associated with the same characters were included in the same order in both stories. When asked to name each food item and the character associated with it the reader could recall more items and characters from the restaurant text than from the supermarket schema. Anderson et al. concluded that the reader's familiarity of the structure of a restaurant meal, from appetizer to dessert, aided the recall of the text.

If a reader's knowledge of text structure is crucial to reading comprehension how does a reader without an appropriate structure cope? A study by Christopherson, Schoultz, and Waern (1981) in part addresses this question. Readers were asked to read an intentionally ambiguous text originally used by Johnson (1972) describing the procedure for washing clothes. While no information in the text was misleading neither was there information that confirmed the process being described was washing clothes. Some readers received a titled copy, Washing Clothes, which made the text unambiguous while other readers received an untitled copy of the text. Not surprisingly, Christopherson et al. report that readers who knew the text was about washing clothes recalled more of the text then readers that did not. The readers that were able to use their knowledge of laundry were able to monitor the text less frequently than readers that didn't have background knowledge. It is interesting to note that the readers without a "laundry" schema looked like inefficient readers. Christopherson concludes:

> The findings to date suggest that some students who have problems understanding and recalling text may not have deficiencies in their listening and reading skills; their difficulties in comprehension and recall may be attributable to the unavailability of relevant prior knowledge, either because the information is not known or because its relevance is not perceived.

Do readers intuitively pick up knowledge of text structures or are they explicitly taught? There is research to support both positions. McGee (1982) compared good and poor fifth graders reading expository text. She found that there was no significant difference between each of the groups when subordinate idea units were tallied. However, both good and poor fifth grade readers recalled more superordinate ideas than did the third grade readers. The researcher speculates that this may be explained by the increase in the number of expository texts encountered in school above the third grade.

Stevens (1982) found that teaching a lesson on the general topic of an expository text improved the comprehension of that text even though no information from the text was taught during the lesson. Stevens presented a high school class with a lecture on the battle of the Alamo followed a day later by a text on the same subject. Information from the lecture was not present in the text yet the students who received the lecture out performed a no-lecture control group on a comprehension test. Apparently, the prelesson established a structure which enabled the readers to incorporate the new information into their background knowledge more effectively than readers without the prelesson.

Graves, Cooke, and Laberge (1983) provided below grade level readers with written previews which were designed to motivate the reader and to introduce the stories and characters. The previews described the plot up to the point of climax. Graves et al. found that the readers who received previews recalled more and scored higher on both inferential and factual comprehension questions. The preview readers also reported liking the previews and finding them useful.

Carr, Dewitz, and Patberg (1983) provided readers with structured overviews before reading a text. They found that below average readers performed much more like the average and above average readers when they used the overview as a prereading device. The researchers conclude that the disproportionate benefit to the below average readers suggests that the above average readers may already intuitively be using a similar organizational structure.

Process Knowledge

Researchers have also viewed background knowledge as knowledge of the processes used to comprehend texts. Exploration of these processes provides insights into how readers comprehend text and suggests teaching strategies.

How does a reader's knowledge of language aid reading comprehension? The use of the semantic and syntactic systems of language have been the focus of several studies. Isakson and Miller (1976) observed readers reading altered sentences that were intentionally written to be semantically and/or syntactically unacceptable (did not make possible sentences in English). They found that good readers tried to correct the violated text as they read while the poor readers read closer to a verbatim text. The researchers conclude that the good readers were guided by their internal knowledge of the syntactic and semantic systems of language.

What happens when readers read "unviolated" texts? Beebe (1980) using a modified miscue analysis (Goodman and Burke, 1972) observed that a reader's substitution miscues vary in syntactic and semantic acceptability. Readers that comprehended the text tended to make substitutions that were both syntactically and semantically within the text. Poor comprehenders seemed not to use these systems thereby producing more substitution miscues that were semantically and/or syntactically unacceptable.

Does this suggest that poor readers lack knowledge of language or that they are not using the knowledge they possess? Cioffi (1982) asked readers to mark where it would "make sense to pause while reading orally." Cioffi found that good comprehenders identified more pause locations than did readers skilled in decoding. However, when he examined the range of grammatical structures recognized by each group he found that, "Skilled decoders and good comprehenders exhibited sensitivity to the same rage of grammatical structures: (page 90). While Cioffi's findings demonstrate that good comprehenders may make better use of syntax it does not support the teaching of syntax directly since both groups showed an understanding of the same grammatical structures. The difference seems to be that good comprehenders made better use of the grammatical information available to them.

If good and poor readers have about the same background knowledge of language do they differ in their knowledge of reading strategies? Researchers have used reader introspection to explore the strategies readers bring to reading. Olshavsky (1976) asked high school readers to read a short text and to stop and introspect about what they were doing and thinking each time they encountered a red dot in the text. Olshavsky categorized these protocols by linguistic unit (i.e. word, clause, or story), and by the process employed. She found that good and poor readers used nearly the same strategies; however, poor readers used them less frequently and less flexibly. Hare (1979) also used introspection to explore reader strategies. She had good and poor readers read both familiar and unfamiliar texts. The students were asked to write down everything they noticed about their reading once they finished the text. Like Olshavsky, Hare found that good readers reported using more strategies than did the poor readers. She also found that as the text became more difficult for both the good and poor readers they all reported using fewer strategies. This suggests that if a good reader is given difficult text s/he will use strategies not unlike a poor reader.

Do readers use nonlinguistic strategies such as imagery in reading texts? In interviews with fifth grade children Finch (1982) found that 90% of the above average readers, and 65% of the below below average readers reported spontaneously using mental imagery during reading without ever receiving specific training. To see if this strategy could improve reading comprehension Finch had readers "form pictures in their heads" as a way of remembering what they had read. The results were disappointing; although small gains were reported, the strategy did not favor poor or good readers, nor was it more useful in comprehending either familiar or unfamiliar texts. While the gain in comprehension was negligible, the fact that so many readers used imagery is interesting and may in part explain why the training had so little affect.

Levin et al. (1974) also explored the reader's use of imagery. They initially tested readers to see if they learned relatively better from pictures or words. Readers who were judged to learn well by pictures (whether or not if they learned well from words) scored higher on a test of comprehension than did readers who were not instructed to use imagery. Readers that were judged not to learn well from pictures (and they generally did not learn well from words either) actually comprehended less than an equivalent group that did not receive instructions. It appears that prescribed use of a specific strategy caused readers to become less flexible as readers.

Will comprehension improve if readers ask themselves questions before they read? Several researchers have explored the direct instruction of questioning strategies. Adams et al. trained fifth grade students to recite and apply a modified SQ3R strategy to studying a social studies text. The researchers trained the readers to:

1. Preview the passage by reading the headings and subheadings.
2. Recite the subheading.
3. Ask yourself questions about what might be important to learn.
4. Read to find the important details.
5. Reread the subheadings. Recite important details. (These first 5 steps are repeated for each subheading in the text.)
6. Rehearse after completing the text.

Students who were trained in this strategy spent approximately twice as much time studying the texts as did the traditional classroom that less than half of the ninth grade readers tested used this "structure strategy." Those that used the strategy were for the most part readers with high comprehension. Specifically teaching the signaling strategy was found to aid only those students who were rated high in basic reading skills yet low in comprehension. The effects of signaling, however, were not lasting. After two weeks those who benefited from the instruction recalled no more information than the equivalent group that read texts without signals.

Is there a comprehension strategy that combines imagery with structure? Smith and Standal (1981) taught college aged readers to use a mapping strategy to visualize a structure of a text. Readers were taught to represent salient parts of the text in a visual map. Interconnecting lines mapped the relationships among the parts of the text. Readers who received the mapping strategy training scored no higher on a comprehension test than did a control group. It could have been that the mapping strategy was too general or simplistic for the college aged readers who used the strategy. A better fit between strategy and reader might have been made with younger readers. Geva (1983) reported success with a far more complex flowcharting strategy which suggests once again that if readers already have the strategy or an equivalent strategy they do not benefit from instruction. Dahl discusses Geva in chapter 8.

Can reading strategies be taught? It is clear from the research that reading strategies are learned, but whether or not direct instruction of strategies promotes the learning of reading strategies is not so clear. It must be remembered that many strategies represent tacit knowledge and may already be known and used by the reader although s/he may not be able to explain it. We must also keep in mind that knowing how to use a reading strategy in no way guarantees that the reader knows when it's appropriate to use that strategy.

Pragmatic Knowledge

Reading comprehension may be studied as if it exists in isolation; but in fact, every reading event takes place in an environment, within a given time period, and for some purpose. A reader's knowledge of the constraints, potentials, options, expectations and procedures relevant to the task at hand is pragmatic knowledge that will affect what is comprehended and how well it is comprehended.

Do the teacher's beliefs about learning and reading affect reading comprehension? To the degree that a teachers beliefs are reflected in how reading is taught, comprehension may very well be affected. Mosenthal (1983) suggests that teacher's theoretical orientation may affect the reader's reliance on prior knowledge. He found that teachers who relied on a single text and looked for "correct" responses elicited responses from the readers that reflected the current text. Teachers who encouraged thinking processes in the discussion of texts generated responses from the readers that not only made use of information from the current text but also from other texts and from prior knowledge as well.

Do the student's beliefs affect reading comprehension? Readers do have insights into factors that affect recall. Hare (see page 9:8) asked readers to predict before reading a text how much of it they would be able to remember and why they would be able to remember that amount. One might expect that the readers would have related how much they already knew about the topic to how much they anticipated remembering. This was not the case. Not one of Hare's sixth-grade readers mentioned background knowledge as either an enabling or a hindering factor. These readers rated themselves as readers and/or commented on the length or the anticipated difficulty of the text as factors that would influence their recall. This does not, of course, preclude background knowledge as a possible factor in the quality of recall. What it does tell us is that these readers have a sense of what is required of them and the text in order to comprehend. A reader's beliefs about the reading process will in part determine where attention will be focused and what strategies will be employed during reading.

Does a reader's cultural knowledge affect comprehension? Lipson (1983) compared the comprehension of Catholic and Jewish students reading a Bar Mitzvah passage and a First Communion Passage. Not surprisingly, she found that readers comprehended more from the within their culture text than from the outside their culture text. Lipson also notes that when readers read texts outside of their culture they tend to apply existing familiar schemata to that text and this then "distorts" the text and decreases comprehension. While Marr and Gromley (see page 9:4) noted a similar strategy in readers they saw it as an assist to comprehension rather than viewing this phenomenon as a "distortion". When appropriate schemata are not available some readers reason and comprehend by analogy.

Reynolds et al. (1982) also was interested in the reader's cultural perspective. The researchers had black and white students each read a passage on "playing the dozens," which is a form of recreational verbal insults found primarily in black communities. In this episode the principal, thinking things were out of control, stepped in to quiet the situation. Reynolds et al. found that the reader's perspective reflected the reader's cultural background. Blacks perceived the incident in the text as "just laughing and joking around", and whites views viewed it as a "riot" or a "fight." Which perspective is "right" is a culturally biased question. When the culture of the author is unfamiliar to the reader that reader finds the best fitting schema on which to build meaning.

Can a reader's perspective actually change the meaning of a text? Anderson et al. (1977) constructed ambiguous texts which were read by either music students or athletes. One of the texts was written so that it could be interpreted as being a group of friends coming together to play cards, or as being a rehearsal session of a woodwind ensemble. In almost all instances the readers's comprehension reflected one and only one perspective throughout the text and this perspective was greatly influenced by the reader's course of study. Athletes, with few exceptions, viewed the ambiguous Card Game/Music passage as a card game while music student viewed it as a rehearsal.

If readers "take on" an assigned perspective will their comprehension be affected? Pichert and Anderson (1977) assigned readers to one of three perspectives; a homebuyer, a burglar, or no assigned perspective. The readers then read and recalled a story about two boys who played hooky and spent the day in the home of one of the boys. The researchers found that perspective did influence what was judged as important in the story and what would later be recalled. Goetz et al. wanted to see if readers with a natural perspective would recall from that perspective or from an assigned perspective. They assigned police, realtors, and education students to either the burglar or homebuyer perspective using the same passage as Pichert and Anderson used. They found that readers took more time reading the portions of the text that were important to their assigned perspective, and recalled more information that was important to those perspectives than from their naturally occurring occupational perspectives.

Pragmatics of reading comprehension is by in large uncharted territory. In the next section we will survey pragmatics in action and recommended a new course for research and instruction.

A CRITICAL REVIEW OF THE RESEARCH

What does this body of research tell us about readers and their use of background knowledge? The research demonstrates the importance of considering background knowledge in both research and instruction. It falls short, however, in assessing its full impact on reading comprehension. In this section we will consider these concerns and discuss the issues they raise.

Contributions of the Current Research on Background Knowledge

The research on background knowledge has contributed much to the understanding of reading and reading comprehension. In particular, this body of research:

1. Demonstrates the necessity of background knowledge to reading comprehension. There is no disagreement that content knowledge (Langer, 1981; and Lipson, 1982), perspectives (Anderson et al., 1977), structures of language (Isakson et al, 1976; and Cioffi, 1982), and structures of texts (Meyer, 1980) all affect reading comprehension. The only debate here might be to what extent background knowledge affects comprehension.

2. Demonstrates that the use of background knowledge in comprehending text casts the reader as an active seeker of meaning rather than a passive recipient of it. Insights from this research challenge the theoretical perspective of information transfer which does not rely on background knowledge and assumes readers acquire 'the meaning' of text, from text, through the application of a set of skills (see Harste, chapter 12). Contrary to the information transfer perspective the current research on background knowledge suggests that comprehension, in part, is a result of the interaction between specific types of prior knowledge and the text.

While these research findings firmly establish a relationship between background knowledge and reading comprehension much has been left unexamined. It is my belief that the current research does not go far enough, individually or collectively, in explaining the complex processes employed by readers in utilizing background knowledge in the comprehension of text.

Background Knowledge in Practice

The contributions and the shortcomings of the current research on background knowledge can be demonstrated through the following vignette which is intended to highlight both the charted and the uncharted territory of background knowledge. As you read this episode, consider the types of background knowledge required of Amanda and what types of background knowledge she actually uses to complete her task.

> Amanda was upset. She knew she was a very good sixth grade student, and yet whenever she read from her social studies text she felt dumb. She had read the chapter on ancient Egypt carefully - sounding out unrecognized words, using the dictionary to find the meaning of several of them, intentionally slowing her reading rate to a crawl - and yet she was unable to answer any of the comprehension questions at the end of the chapter. In frustration Amanda returned to the beginning of the chapter and began rereading. She paused in the first paragraph to underline what looked like a topic sentence of that paragraph. Amanda continued, paragraph by paragraph, underlining topic sentences. After a page and a half of underlining she abandoned this strategy to skim the text for key words found in the questions. Upon finding a key word from the first question Amanda copied the sentence containing the word and labeled it number one. Each of the remaining questions were answered in a similar manner. Amanda had just completed the final question as her teacher collected the papers.

In this episode we see Amanda working through a social studies assignment. The decisions she made as she negotiated this lesson were based on the knowledge she brought to the learning event. We will examine the decisions she made in light of the research previously reported. While the research on background knowledge informs us about some of Amanda's decisions, we will also have to look beyond the research for other insights.

How does the current research relate to Amanda's use of background knowledge?

Content Knowledge. From the strategies Amanda used to complete her assignment we have no evidence to suggest that she has background knowledge on ancient Egypt. Nor is there evidence that she, as Marr and Gromley (1982) observed in their subjects, utilized a parallel or related topic to support her learning about ancient Egypt. Whether Amanda had background knowledge on Egypt or a related topic and chose not to use it or whether she had no background knowledge available to her can not be answered from the current research on background knowledge. Most of this research looks at the relationship of the quantity or quality of content knowledge to reading comprehension (Holmes, 1982)). To gain insights into Amanda's decisions to use or not use potentially available content knowledge requires the research to look beyond content knowledge itself to the constraints and opportunities currently available to Amanda within her present situational context.

Structural Knowledge. We can see from this example that Amanda expected texts to be structured and that she assumed she could use those structures in completing the assignment. She demonstrated her understanding that paragraphs are structurally organized by seeking out and underlining what appeared to be topic sentences. She apparently anticipated that attending to this organization would support comprehension of the text. This assumption has been addressed and supported by research (Taylor, 1982; and Mosenthal, 1979).

In her change of strategy we see that Amanda expects this text to be semantically organized so that if she locates a term within the text she has also located that portion of the text that deals with that term. In a crude sense Amanda is assuming an overall text structure in applying this particular strategy. From Amanda's decision and the review of research, we can see that both student and researcher recognize the value of text structure to reading (Meyer et al., 1980).

Other than for Amanda's search strategy she shows no evidence of considering a macro structure in this text. From this single lesson we might be tempted to conclude that Amanda knows little of the structure of text. To jump to this conclusion would be to assume that Amanda was trying to use macrostructures in her reading but failed. We do not know whether Amanda lacked the experience to utilize the structure of the text effectively or if she intentionally chose from other more attractive options. What we do know is if we want to know about Amanda's use of text structures we would have to observe her in other sessions and have her reflect on her decisions.

Process Knowledge. In completing the assignment Amanda employed a sequence of strategies which included some fairly conventional reading strategies, followed by a structural paragraph strategy (Mosenthal, 1982), and finally she employed a skimming strategy (Taylor, 1982). Each of these strategies have been addressed in the research on background knowledge.

Amanda's initial reading strategies were fairly typical outcomes of reading instruction - sounding out, looking up, and slowing down. Olsnavsky (1975), and Hare (1978) found that like Amanda, a repertoire of strategies exist for readers to use during their reading.

Amanda tried to apply what she knew about the structure of paragraphs to the comprehending of the text. Although this particular method of analyzing paragraphs proved not to be useful, Geva (1983) demonstrated that other strategies to develop a sense of structure did support comprehension.

Giving up on the first two strategies, Amanda tried yet another strategy - locating a single term within the text. On the surface this might look like a totally idiosyncratic strategy. What reader however, hasn't looked to the index for the location of a particular subject from a key word? Although Amanda skimmed the text rather than used the index (assuming there was one) the strategy served the same function as using the index.

The research on background knowledge allows us to describe the sequence of the processes Amanda employed in this task, but the research does little to explain the decisions Amanda used in selecting what she determined to be appropriate strategies.

Pragmatic Knowledge. Except for the research on reader perspective, pragmatics is a largely uncharted territory. It is by far the least represented and undoubtedly the least understood type of background knowledge. Pragmatics refers to all the knowledge we posses on how to get things done and to live within our immediate environment and culture. Every decision we make is in part based on what we know about the situation, about our goals, and about probable outcomes of our actions - these are decisions based on pragmatic knowledge.

The research on pragmatics and reading comprehension has been concerned solely with perspective - either a reader's personal perspective (Anderson et al., 1977; and Pichert et al., 1977) or the reader's cultural perspective (Kintsch et al., Lipson, 1973; and Reynolds et al., 1982). We can assume from this research that readers, like Amanda, view reading tasks through a perspective or perspectives. Just what perspective Amanda used is not available to us and therefore the effect of her particular stance is also unknown.

Most of Amanda's decisions during this lesson were based on pragmatic knowledge that is outside of the scope of current research on background knowledge. Amanda's knowledge of the classroom rules, the importance of school in Amanda's life, the perceived relevance of ancient Egypt, the knowledge of the task demands (Mosenthal, 1983), her understanding of the consequences of careless work, the time allotted for the task, her rapport with the teacher, her social position in the classroom, her parent's expectations, and more - all play a role in the decisions Amanda made in the course of completing her lesson. To better understand reading comprehension we must better understand this important type of background knowledge.

Context of Situation The accessing of background knowledge does not occur in a vacuum. The episode of Amanda completing a social studies lesson exists within an environment - a specific classroom on a specific day at a specific time. This context of situation also played an important role in the way Amanda used her background knowledge. Current research on background knowledge has largely ignored this factor or has tried to control it through manipulation.

Where Amanda sat in the room, who sat near her, the location of the teacher, the subject being studied, the writing style and organization of the author of the text, the temperature, the noise level, the time of day, the time of year, and the materials at hand are but a few of the elements within Amanda's immediate environment that directly affected the decisions she made and therefore the background knowledge she tapped. To appreciate the complexity of Amanda's use of background knowledge we also must recognize the complexity of her immediate environment; to ignore or to attempt to control the transaction between the context of situation, and the background knowledge of the reader is to distort the very conditions under which background knowledge operates.

In the discussion and review of research on background knowledge we have viewed each type of background knowledge as existing independently from one another, yet we can readily see from Amanda's example that all the types of background knowledge are available and are used simultaneously within a context of situation. No single experimental treatment, in fact no collection of individual experimental studies on types of background knowledge, can illuminate the processes readers employ in orchestrating their background knowledge. If we as researchers manipulate the process or focus on anything less than its whole or strip it from the context in which it is found, then we have changed the very event we set out to discover.

Rather than explaining Amanda's behavior by any single type of background knowledge or any collection of types of background knowledge, there are advantages to looking at the total context of situation in viewing the impact of background knowledge.

First, Amanda is a valuable resource for informing the researcher or teacher about her reading. Readers as informants can provide insights not available through observation or testing such as the underlying reasons behind the reader's decisions. The informant can reflect upon the entire event and therefore need not be bound by single categories such as "background knowledge" within the process of comprehension. For the researcher these data embed background knowledge within the total reading event including the context in which it took place. Only in this total context can the contribution of background knowledge be viewed as an integral part of the reading comprehension process.

Second, viewing background knowledge in a total context of situations allows for the generation of hypotheses that would not have been possible to generate when looking solely at background knowledge, in particular when looking at only one type of background knowledge. These questions have the potential to better explain the reader's use of background knowledge in actual reading events.

Without a consideration of the context of situation we gained little insight into Amanda's decision making processes. We don't know why she chose the options she did, or even what options were currently available to her. In part this problem exists because the current body of research has been concerned with investigating the interiors of specifically defined types of background knowledge and has not addressed the interrelationship of these types of knowledge or its transaction with the context in which it occurs. To get a sense of its full contribution to comprehension it might be advantageous to consider background knowledge not as distinct types of knowledge but rather as a unified whole that exists only within a context of situation. We may be missing the forest for the trees.

Issues Raised by the Studies

There are several issues on background knowledge that must be considered if we are to better understand readers or the reading process.

The fact that readers have and use background knowledge and that background knowledge is essential to reading is of course not disputed today. What is not known, however, is how readers go about using that knowledge, and if our current conceptual construct of background knowledge adequately explains the process of its use. These are areas that may provide useful information for teachers and researchers.

The review of the research on background knowledge and the example of Amanda's social studies assignment generate several issues that deserve further exploration.

1. Can background knowledge meaningfully be studied as isolated subsystems of knowledge as most researchers are currently doing? More specifically, can each type of knowledge be investigated without considering the relationships between, and the transaction

among, each of the specific types of background knowledge?

2. Does the context of situation affect the reader's access to background knowledge? If so, plans for both research and instruction must consider the numerous constraints, potentials and expectations inherent in the total context of situation which might direct a reader's use of background knowledge.

3. Do readers merely apply background knowledge to comprehend text or does each reading event pose a potential for the discovery of new strategies to satisfy current demands? While much of the research has looked for the effect of background knowledge on reading comprehension, none has looked at the generative potential of background knowledge to create new strategies, or new meaning.

4. Can background knowledge be meaningfully viewed from a single point in time (i.e. one lesson, or a single experimental treatment) or must it be viewed across contexts and therefore across time?

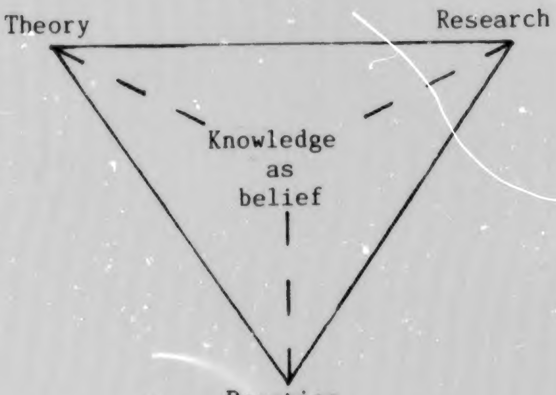
5. Must pragmatics be simultaneously considered when investigating other types of background knowledge?

6. Do good and poor readers differ in their access to or use of background knowledge in comprehending text? Current research is divided on this issue. While most report differences between readers (Taylor, 1982; and McGee, 1982), the differences are often attributable to the difficulty of the text for any particular reader. This suggests that "good" and "poor" readers differ little when each are confronted with a text that is of equal difficulty for them to read (Olshavsky, 1976; and Hare, 1978).

IMPLICATIONS FOR THE TEACHERS AND RESEARCHERS WITHIN US

The implications discussed in this chapter are drawn from studies with sample populations ranging from middle school to college age. Some studies used heterogeneous groups, others contrasted good comprehenders and poor comprehenders, and there were also studies that used "have" and "have not" background knowledge groups. These studies might also be categorized as basic and applied research. One might ask with this diversity across studies is it appropriate to pose implications? I think so, provided we understand that research is but one perspective on knowing. Theory and practice both represent other available perspectives. Figure 1 presents a model of knowing. It is intended to remind the teacher and researcher that knowing requires multiple perspectives and that these perspectives transact to allow for new understandings.

Figure 1
Perspectives on Knowing



Burke 1984

In the course of our professional involvements we assume a number of perspectives. While we may generally identify with one perspective, each perspective or stance we employ allows us to see, to know, in a different way.

Teachers are educational practitioners as they plan and direct instruction. While teachers may generally take this stance they are also educational researchers when they formally or informally seek answers to the many problems and anomalies they encounter in a typical school day. And simultaneously, teachers are educational theoreticians in that each of these decisions is predicated on models of learning, cognition and language.

Educational researchers undoubtedly identify with a researcher perspective when conducting formal research, but like teachers they are also practitioners and theoreticians - practitioners when concerned with research procedures for their subjects and applications for teachers, and theoreticians when they build their research design on theories of learning and cognition and when generating their own theories.

These implications are intended to provide yet another perspective for the researcher, the theoretician, and the practitioner in each of us.

Implications for Teacher/Researchers and Researchers

1. Research should account for the context of situation. Understanding that the context in which reading takes place

affects what is comprehended provides both problems and opportunities for teacher/researchers and researchers. The teacher/researcher is ideally suited for research that considers children's pragmatic knowledge and the context of reading. It is the teacher that plays a major role in establishing the environment, it is the teacher that knows the children across contexts, and it is the teacher that has a sense of what background knowledge children bring to the reading task. These valuable insights are needed if we are to understand reading comprehension. The outside researcher must come to know and consider the affect that context of situation plays in the decisions a reader's makes. This can not be adequately done by putting readers in unfamiliar situations or by a single visit to a classroom. Getting to know the students and the rules under which they operate should be baseline data for any reading research and "findings" should reflect the context in which they were "found".

2. Research must take into account how the reader views the research task. The perspective taken by the reader is based on pragmatics and will affect the reader's decisions related to the purpose, the intent, the process, and the importance of the task. If we want to know what readers are thinking there is no better way to begin than to ask them. Interviewing along with "kid watching" should be standard procedures of the researcher.

3. Research should reflect the transaction among types of background knowledge and the environment in which the research takes place. While we can intellectually think about "types" of background knowledge they only individually exist as an abstraction. The resources on which the reader draws respect no arbitrary categories.

4. The exploration of types of background knowledge might be more fruitful if researchers examine conditions under which readers use various types of knowledge.

5. While research has begun to describe the strategies readers report using from a metacognitive perspective (Olshavsky, 1976; Hare, 1982; Winograd, 1983; and Christopherson et al., 1981) we do not yet know what processes drive those decisions. In exploring these processes it might be useful to get introspective accounts of reader decisions across varied contexts. When context is held constant, factored out, or ignored we get a false sense of simplicity.

6. A better understanding of pragmatics is needed in research on background knowledge. Pragmatics has been largely overlooked by research, while content knowledge, text structures, and more recently process knowledge have dominated the study of background knowledge. Studying readers where they read, using what they read, for the purposes that they generally read would tap the largely unexplored territory of pragmatics.

Implications for Instruction

1. The overwhelming finding from this research is that background knowledge improves reading comprehension (Langer, 1981; Lipson, 1982; and Ribovich, 1979).

   - Teachers may find it useful to build general background knowledge. This could be done by; providing time and materials for a wide variety of independent reading, discussing current events from television and newspapers, providing time and means for children to share their interests and talents, enriching the classroom environment through interest and exploration centers.

2. Teachers can directly provide background knowledge, which, in turn may improve reading comprehension of expository texts (Stevens, 1982).

   - Teachers may find it useful to provide experiences related to the text. These experiences should involve as many senses as possible in order to build a rich experience base.

3. Accessing reader's existing background knowledge improves reading comprehension.

   - Teachers may find it useful to provide activities related to accessing topics before students read about them. These might include; having students establishing purposes for reading, discussing the topic, relating unfamiliar topics to familiar experiences (Marr et al., 1982), brain storming to discover what is collectively known about the topic. previewing the text (Graves et al., 1983, and providing advanced organizers for difficult texts (Ausubel, 1963).

4. The direct teaching of comprehension strategies can actually make students less flexible readers (Levin et al., 1974; and Balajthy, 1983)

   - Teachers may find it useful when introducing reading strategies to demonstrate alternate approaches and to encourage students to suggest still other strategies so that the learners understand that there are always mulitple options from which to choose.

5. The context in which reading takes place affects what background knowledge is utilized and what is comprehended.

   - Teaches may want to provide a variety of situational contexts for reading instruction and evaluation. These might include;

encouraging letter and note writing, reading to younger children, providing a daily free reading time, setting up a comfortable reading area in the classroom, and providing choice in a variety of reading materials and activities.

6. The cultural match between the perspective of the child and of the text affects comprehension (Kintsch and Green, 1978; Lipson, 1983; and Reynolds et al., 1982).

   - Teachers may find it useful to help students handle culturally unfamiliar texts. This might include; presenting and discussing cross cultural literature including literature from other time periods, discussing authors and their cultural backgrounds, and relating culturally unfamiliar material to culturally familiar ideas. The teacher should also recognize that what is culturally familiar to the teacher may not be to the students.

7. Directly teaching story grammar showed little or no affect on reading comprehension (Dreher and Singer, 1980; and Whaley, 1981).

   - Teachers may find it useful to capitalize on student's intuitive knowledge of story grammar by providing frequent opportunities for students to write stories, read stories, and to discuss the art and skill of being authors.

8. Teaching expository text structure strategies improved the comprehension of poor readers (Meyer et al., 1980; Carr et al., 1983; and Geva, 1983).

   - Teachers may find it useful to teach mapping strategies (Smith and Standal, 1981) and flowcharting strategies (Geva, 1983) of both the students background knowledge and the expository text.

9. Teaching the development of summary statements helped readers become sensitive to the macrostructures of texts.

   - Teachers may find it useful to provide experiences in developing summary statements from a wide variety of material that students can then share, compare, and discuss.

10. As readers change their perspective, they create different understandings of a text (Anderson et al., 1977; and Anderson and Pichert, 1978).

    - Teachers may find it useful to provide experiences that allow students to take on alternate perspectives. This might include; reader's theater, plays, reading essays, and assigning perspectives to students before reading a text or rereading a text from a different perspective.

11. Good and poor readers demonstrate similar comprehension problems under equivalent conditions. These include when they lack background knowledge relevant to the text (Holmes, 1983) and when they read texts in which they have not had sufficient prior experiences (Hare, 1978).

    - Teachers may find it useful to provide a variety of print material related to the subject, and provide activities that build background knowledge or that help students access existing background knowledge. In evaluation, teachers should also consider the reading material and the purpose for reading as contributing factors in reader comprehension difficulties.

12. Good and poor comprehenders do not differ in the reading strategies they employ (Cioffi, 1982; and Olshavsky, 1976). They do differ, however, in the degree they rely on specific reading strategies.

    - Teachers may find it useful to provide opportunities for students to discuss what they do when they read difficult text. This will demonstrate to the students that readers have multiple options available to them when they read.

Conclusion

The research is clear that background knowledge is important to reading comprehension. This is a giant step forward from the notion that reading was simply an information transfer process that required nothing more of the reader than a rote set of skills. Our current challenge is to take that next step in exploring how background knowledge fits into the larger picture of the context of situation. For the teacher this might include developing strategy lessons that encourage the use of multiple types of background knowledge accessed in multiple ways. And for the researcher this should include investigating the decisions readers make in selecting from their reservoir of background knowledge.

To understand reading comprehension we must also understand background knowledge and the contexts in which reading takes place. Teachers are particularly well suited for this exploration. The day to day contact with readers provides valuable opportunities for teachers to observe, to explore, and to recognize the unknown. There is a researcher in every teacher. In chapter ten Snyder discusses how to let him/her out.

Chapter 10

TEACHERS AS EXPLORERS: TEACHER-RESEARCHERS AND PRESENT RESEARCH NEEDS

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INTRODUCTION

Whether teachers engage in research in their roles as teachers or whether they invite the collaboration of professional researchers, teachers are key figures in the field research which many educators now see as crucial to our ability to plan for effective teaching in the future. Whenever teachers observe their students, evaluating their problems and progress, whenever teachers make informed guesses about the needs of their students and how to help them meet the demands of the curriculum, whenever teachers observe the effects of the instructional strategies they use, deciding on adaptations and then trying them out, whenever teachers engage in any of these activities, they are doing research. Teachers are constantly engaged in formulating and exploring hypotheses about how to make their classrooms effective places of learning.

The students who, for one year of their academic lives, come under a teacher's guidance provide both a challenge and a burden, and teachers are keenly aware of their responsibility to nurture each one. It is this responsibility to the individual child that provides the form of the teacher's research question. The teacher is constantly asking, "What does _this child_ need to experience in order to learn X?"

It is the concern for the individual child which often distinguishes the teacher-researcher from the professional researcher. The professional researcher is most often concerned with gaining generalizable insights. Rather than asking, "What process does this child need to go through in order to learn X" the professional researcher asks, "What process do _most children_ need to go through in order to learn X?" or "What materials, instruction, etc. facilitate the learning of X for most children?" While the professional researcher's questions are of interest to the teacher, since their answers provide a starting point in dealing with particular students, they provide only that --- a starting point. The teacher's research question remains: "How do I nurture _this_ child?"

Today, professional researchers are beginning to be concerned with the teacher's research question --- not because they have abandoned their interest in the general characteristics of learners, but because they have become interested in understanding more deeply the diversity of characteristics among learners. This type of research focus requires a different research approach. Rather than sampling large populations, these researchers focus on in-depth descriptions of individual cases or individual classrooms. They ask, "How does learning occur for this individual in this situation?"

The value of such research is not only in the documentation of diversity among learners; it is valuable as well as a test of and as a deeper exploration of generalizations suggested by experimental research findings. Individual cases provide an in-depth, ground-level view of features only grossly perceived at an elevated, generalized level. It allows researchers to deal with learning as it is known to all teachers --- as a complex and individualized interplay of phenomena.

There are some practical differences between teacher-researchers and professional researchers. Teacher-researchers often do not have training in the rigorous data documentation and analysis which is required in order for their conclusions to be accepted in a public forum such as a journal. Nor do teachers as a whole perceive their professional activities as including research and publication. Thus teachers' informal findings and intimate knowledge about how students learn fail to reach the public arena. Professional researchers, on the other hand, are often constrained in their research by time, funds, and access to "real" classroom situations. The concept of long-term research in the field has come of age, but the factors inhibiting its practice remain strong.

While research conducted in the schools is on the rise, it is still of a short-term nature and often takes the form of comparative testing or testing in conjunction with brief treatments done out of the context of the normal classroom setting. Very few studies involve more than a day's duration and even fewer go beyond a week. This means that classrooms and learning as they naturally occur seldom appear in the research literature. In recent years, however, some researchers have attempted in-depth descriptions of various aspects of classrooms and learners in action.

While more field research is being conducted in some areas of educational research, the research on _reading comprehension_ shows few instances of it. Our study has yielded a number of interesting insights about the nature of the research being conducted in this area. I would like to share with you our preliminary findings regarding the kind of teacher-researcher cooperation currently occurring in reading comprehension research. This will be done in two ways: 1) by sharing the overall trends in the type of research being conducted, and 2) by sharing some examples of studies which have been undertaken in the classroom with the cooperation of teachers.

CURRENT TRENDS IN THE TYPE AND LENGTH OF READING COMPREHENSION STUDIES

Reading comprehension as an area of interest for researchers has increased over the past decade according to the preliminary figures derived from our review of comprehension research. (This can be seen from the data presented in Figures 1, 2, and 3.) This is an encouraging trend when one considers how crucial the comprehension of text materials is to all aspects of educational life.

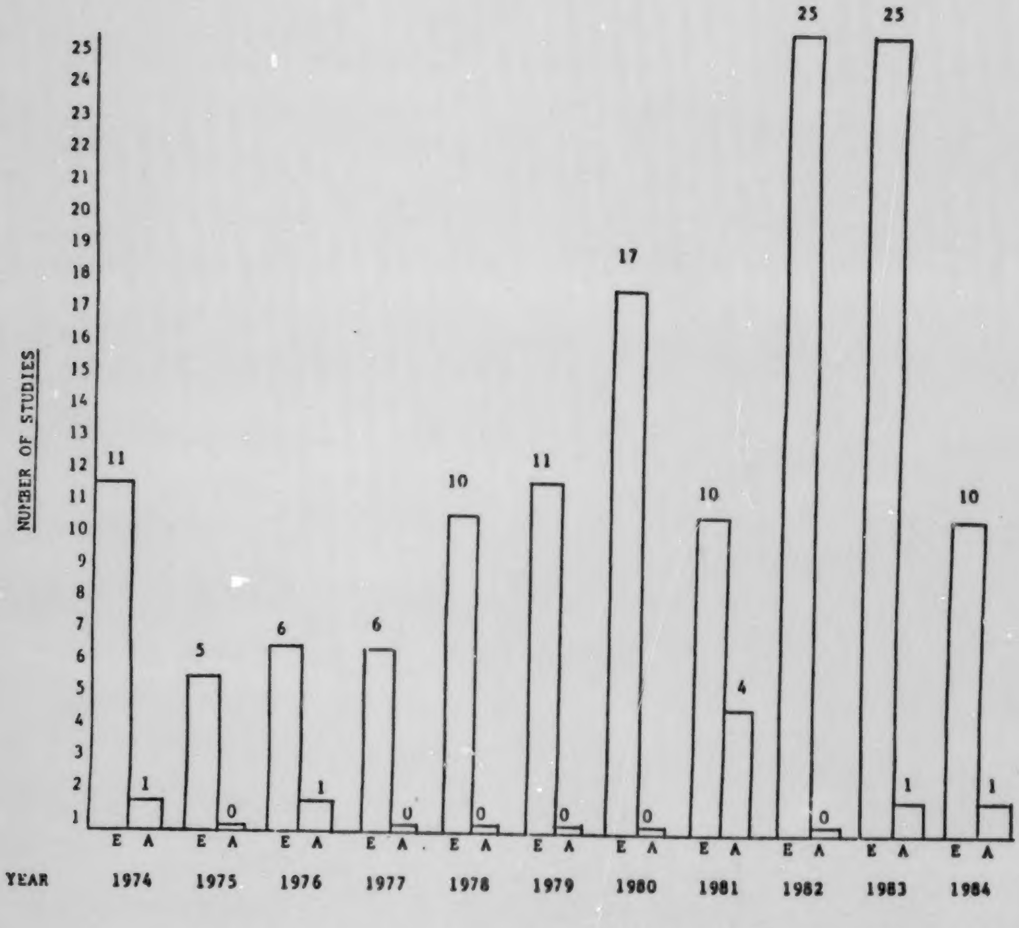
Of special concern here is the type of research which is being conducted on reading comprehension; specifically, "Does the research focus on reading comprehension as it occurs in action with students in classrooms?" Or, "Does the research focus on isolated elements of the reading comprehension process?" Research focusing on reading in action would be, for example, research in which the investigator observed children engaged in their usual classroom reading activities, or in which the researcher asked children to read and react orally, or in writing or in pictures to stories or expository texts. Research which focuses on isolated elements of the reading process might, for example, examine children's ability to sound out new words while reading aloud; or it might have children read short, unrelated passages and then test their ability to recall the main idea of each. Of the two general approaches, the latter is currently much more often pursued in reading comprehension research.

Figure 1 shows the relative number of these two general approaches to research in the field. Studies targeting isolated elements of reading comprehension for investigation far outnumber studies investigating reading comprehension in action and as it occurs in usual situations. There has been, however, a steady interest in reading comprehension research in the field, and one might even assert that a slight increase in interest is in the wings.

When it comes to the length of time spent in data collection, most researchers acknowledge that the longer the examination of a phenomenon, the better one's understanding of it. The length of time spent in data collection, then, is seen as important, but it suffers from practical constraints; studies are designed to meet budgets and schedules. Preliminary data from our study, however, suggest that there is a definite trend toward comprehension research of longer duration. Still, as shown in Figure 2, the overwhelming number of studies undertaken, even in the 1980's when the duration of studies increased, remained at less than one week in length. There is, it appears, a trend toward longer studies of reading comprehension, although this trend has by no means overcome the preference of many researchers for very brief studies.

FIGURE I

TYPE OF STUDY BY YEAR



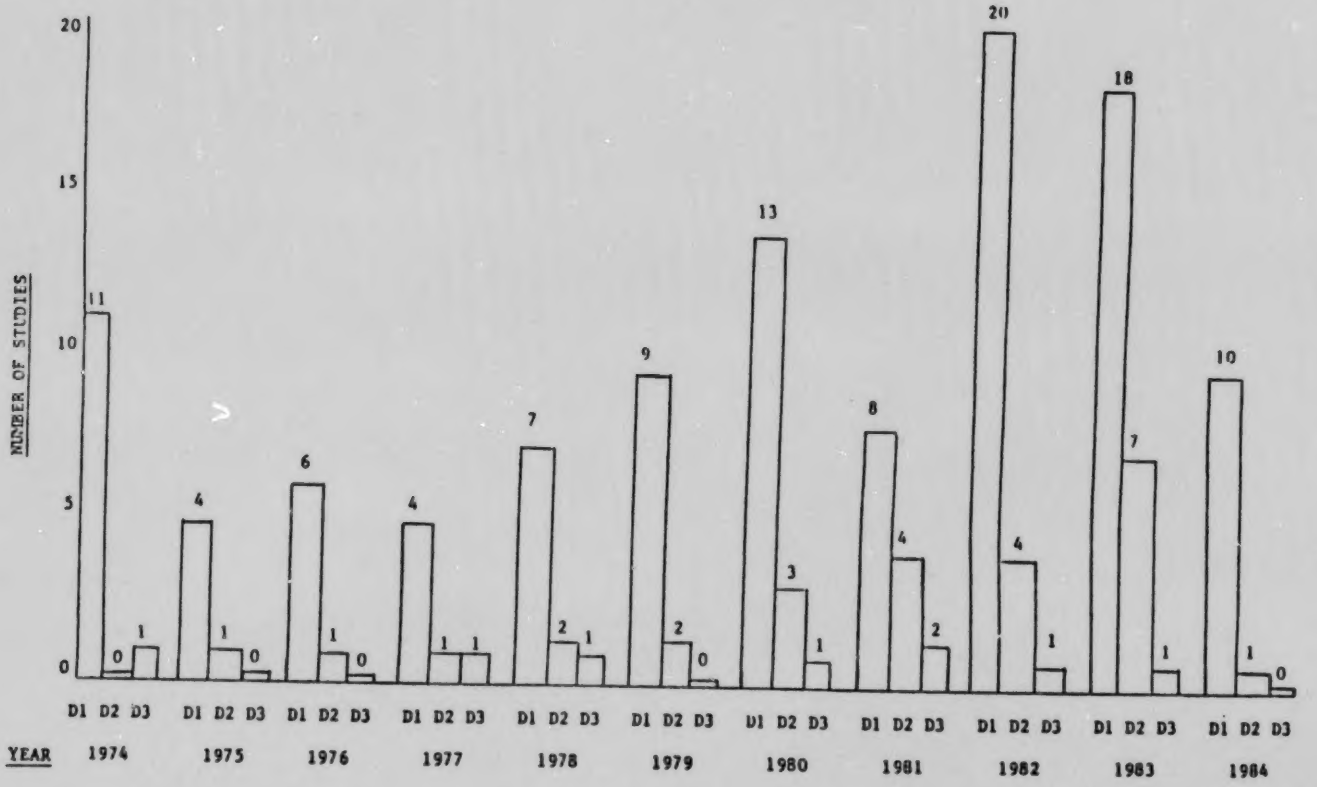
(Preliminary data reflecting studies coded as of August 1984)

E = Focus on isolated elements

A = Focus on classes/students in action

FIGURE II

DURATION OF READING COMPREHENSION STUDIES BY YEAR

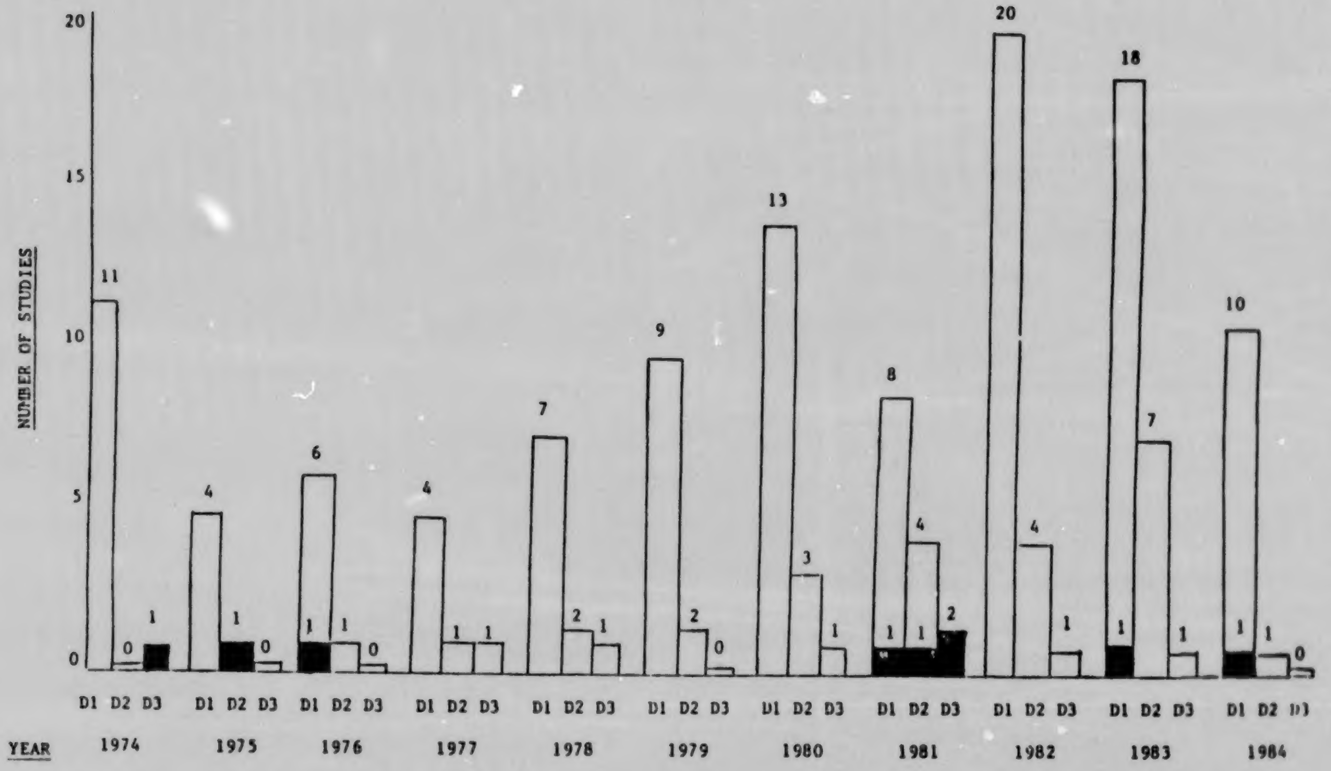


(Preliminary data reflecting studies coded as of August 1984)

D1 = 1 week or less
D2 = 2 to 9 weeks
D3 = 10 or more weeks

FIGURE III

DURATION OF READING COMPREHENSION STUDIES BY TYPE OF STUDY BY YEAR



(Preliminary data reflecting studies coded as of August 1984)

D1 = 1 week or less
D2 = 2 to 9 weeks
D3 = 10 or more weeks
▭ = Focus on isolated elements
■ = Focus on classes/students in action

Figure 3 displays the two trends mentioned here, i.e. type of study and length of study in combination. Studies of very short duration (1 week or less) which focus on isolated elements of reading comprehension are by far the most popular type of study pursued by researchers. There is a gain, however, in the number of studies focusing on isolated elements, which involve from two to nine weeks in data collection. While there is no preponderance of studies focusing on classes and students in action or on lengthy studies (10 or more weeks), the slight increases in such studies suggest that they are representative of research concerns which are currently afloat.

Studies of longer duration and studies involving classrooms and students in action often require resources which researchers may not have --- namely access to classrooms over long periods, and time and funds. Such are the constraints which operate to curtail the type of studies which many researchers may want to undertake. Collaboration between teachers and researchers and the initiation of studies by teacher-researchers themselves can do much to chip away at obstacles such as these.

STUDIES WITH TEACHER-RESEARCHER COOPERATION

What can occur when teachers and researchers cooperate in exploring what is involved in reading comprehension? Six examples of studies which have been conducted in the field, involving the cooperation of teachers and researchers, follow here. Two are examples of studies which were short in length (1 week or less) and conducted outside the normal classroom, but which required students to deal with the kind of materials they frequently encounter in their usual classroom situations. Two are examples of longer-term studies (10 or more weeks) which were conducted in the classroom. Finally, two studies are examples of non-experimental, long-term studies which were conducted in the classroom. Of special interest in each case are three things: 1) the crucial role of teacher cooperation in making the research conducted possible, 2) the kinds of insights which were possible due to the research being conducted within the classroom environment, and 3) the kinds of insights which were possible due to the length of time during which the data were collected. Each case in an example of a study well done; each demonstrates that the quality of the insights which are at all possible from any study are as much the outcome of the degree of that study's immersion in the classroom as they are the outcome of any particular task or measure used in the study.

Study 1: Pressley (1976). Mental Imagery Helps Eight-Year-Olds Remember What They Read.

This study is an example of the way in which researchers, attempting to simulate the type of materials and student processing which could go on in a typical classroom, can arrive at insights which are highly informative to classroom teachers. Pressley wanted to know whether children's reading comprehension would be improved if they were encouraged to make mental images of the materials they read. He divided 86 third grade children into two groups, and instructed one of the groups in how to make mental images of their reading material and gave them practice in doing so. The other group received no instruction. He then tested both groups, asking the children in the imagery group to make mental images after each page they read, and asking the non-instructed children simply to do what they needed to do (which may very well have included imaging) after reading each page in order to remember the information on that page. The test of recall included twenty-four short-answer questions about events in the story they read.

What Pressley found was that the children who were encouraged to make mental images of the material did, in fact, recall more events and details in the story than did the children who may have used imaging in part, but were not encouraged to do so. His findings seemed to gain even more strength when he looked at the time spent on the entire reading task by each group; the group using mental imagery took no longer than the group using unspecified recall strategies. The implication of this was that the imagery group's greater success could not be assigned simply to their spending longer in reading and concentrating; their greater recall must have had to do with the imagery strategy itself.

Because this study was conducted with children in a reading group very much like the reading groups in many classrooms, because it used a story very much like the stories children encounter in their school readers, and because the imagery strategy is one which could easily be incorporated into classroom reading activities, this study is one which is of direct interest to educators in the field, i.e. to classroom teachers. This study demonstrates as well the type of research which teachers themselves could initiate and carry out within their own classrooms, independently of professional researchers, or in cooperation with them.

Study 2: Cohen & Stover (1981). Effects of Teaching Sixth-Grade Students to Modify Format Variables of Math Word Problems.

Cohen and Stover conducted three interrelated experiments in order to find out whether math word problems could be made easier for students to understand. In doing this, they did not want simply to know how to make word problems more comprehensible, but to find out whether students could be taught to do this for themselves. As in the Pressley study, the researchers conducted these experiments and for the most part the children participating as subjects did so outside the normal routine of the classroom. However, the study becomes of great interest to teachers because the object of the reseachers' investigation, i.e. math word problems, is a very real part of a child's experience in school.

The first experiment was designed to discover students' perceptions about what makes a math word problem difficult or easy to comprehend. Thirty-five gifted sixth and eighth-graders were given math word problems with the instruction that they were to rewrite them in order to make them easier to understand for classmates having difficulty in math. Cohen and Stover then analyzed the kinds of changes they made and arrived at a list of twelve types of structural change which students thought would improve the comprehensibility of math word problems. The types of changes most often made were simplifying vocabulary, shortening the sentences, adding a diagram, removing extraneous information, making the question sentence a separate sentence, adding relevant information, changing the order of the ;information given, and providing a clue. Cohen and Stover also conducted interviews with the participating students and found that the students perceived that difficulty in solving math word problems was mainly a question of the verbal presentation of the problem, and not a matter of the problem's mathematical relations.

Through the second experiment, Cohen and Stover wanted to find out whether the modifications made by the gifted students in the first experiment were in fact effective with average students. They chose three of the twelve types of changes identified in Experiment I: 1) adding diagrams, 2) removing extraneous information, and 3) changing the order of the information given so that the problem was set up in the order that the elements would need to be arranged in order to process the problem. They constructed math problems both with and without these three modifications, e.g. five problems were constructed with diagrams, and the same five were presented without diagrams, and so on for the other two types.

Average ability students were then given both types of math word problems and the results were analyzed. It was expected that a 40% difference between simplified and difficult word problems would result, i.e. that simplified word problems would result in 40% more correct answers than would difficult word problems. When diagrams were added to word problems, a 106% increase in correct answers resulted. When extraneous information was removed, a 124% increase in correct answers was attained, and when the order of information was changed to match the order in which the information needed to be processed, the increase in correct number of answers was 80%.

The researchers decided to follow up these unusually strong effects by seeing whether average students could themselves take difficult math word problems and simplify them in order to increase their ability to derive correct answers. In a third experiment, Cohen and Stover took 71 sixth-graders and taught each of them one of the three strategies used in Experiment II for making math word problems more comprehensible, i.e. 1) drawing a diagram, 2) eliminating extraneous information, and 3) putting the information in the order necessary for solving the problem. Thus, 24 students received instruction in the first strategy, and 24 students received instruction in the second strategy, and 23 students received instruction in the third strategy. In this way, the two groups not receiving instruction for a particular strategy served as the control for that strategy.

Instruction was conducted through programmed materials presented in three sessions, each an hour in length. Students were instructed to check to see if a problem could be diagrammed or re-ordered, or if there was extraneous information which could be eliminated, etc. Practice in doing the strategy was then provided. The resulting gains in student achievement on math word problems were quite remarkable. After only three instructional sessions, students learning how to clarify problems by drawing a diagram achieved scores which were 300% better than those of students who did not receive instruction in that strategy. Students who learned how to identify and eliminate information extraneous to the problem scored 344% better than students who received no instruction in how to eliminate extraneous information. And, students who learned how to re-order problems scored 144% better than students who did not. The researchers note, however, that the test problems given required one manipulation only, and that "real life" math problems encountered in school texts often involved a number of complexities which may cause ambiquity in comprehension for the student. Nevertheless, the findings are impressive.

This series of studies demonstrates again, as did the Pressley study, the type of research which classroom teachers might readily incorporate into their normal classroom activities. The researchers investigated only three factors related to math word problem comprehension; many more factors remain to be addressed.

Study 3: Hansen (1981). The Effects of Inference Training and Practice on Young Children's Reading Comprehension.

This study was conducted over a period of ten weeks, and attempted to understand how instructional strategies might be manipulated in order to encourage second-grade children to engage in making inferences based on their reading. While the length of the study enabled the researcher to observe more reliably than otherwise the effects of the strategies she introduced, the treatments were conducted apart from the normal activities of the classroom. Materials normally used in classroom instruction were, however, used in the study.

Hansen wanted to find out whether inferencing could be encouraged in the classroom setting among second-grade children. She was particularly interested in investigating the effects of two strategies which were predicted to enhance inferencing ability. The first strategy was that of relating new information to the already existing background knowledge of the student; the second strategy was that of increasing the frequency with which the teacher posed inferential questions, the idea being that students respond in ways expected of them and in ways in which they have had frequent practice.

Ten stories were taught to three groups of students (two treatment groups and one control group), each over a period of four days. One treatment group engaged in a pre-reading activity designed to help students activate their background knowledge and relate it to elements in the story. The other treatment group received all inferential questions following the reading of the story. In all other ways, both treatment groups were dealt with in the same way as the control group. The control group followed the normal procedures of a basal reading lesson, i.e. initial vocabulary instruction, a pre-reading activity, guided reading with a ratio of 5:1 of literal and inferential questions, and finally phonic and skills activities.

Hansen found that both the background strategy treatment and the inferential questioning treatment improved the inferencing scores of students in the classroom setting. Of the two treatments, the background strategy treatment seemed to have a greater effect on inferencing performance than did the inferential questioning treatment. Of interest as well was the finding that the recall of literal information in the stories was greater in each of the treatment groups than in the control group, which focused primarily on literal level information.

This study is highly suggestive for the classroom teacher who is concerned with helping students deal with material at higher levels of comprehension. It also suggests to teachers paths of exploration which they could formally, or informally, pursue in their own classrooms.

Study 4: Siegel (1983). Toward an Understanding of Reading as Signification.

This study was conducted over a period of seven months and involved extensive cooperation between the researcher and the classroom teacher. Siegel was interested in understanding how children arrive at interpretations of things they read. She spent the first three months of her time in the classroom in observing the teacher and the children in their usual interactions. During the final four months of data collection, she met with groups of students and observed their sketches and interpretations of stories which they read together. The interactions were audio- and video-taped; interviews with students were collected as well.

Siegel found that children were influenced by five factors in interpreting texts through the medium of sketches: 1) by their ideas about what the social situation required, 2) by their perceived skills as artists, 3) by the nature and constraints of sketching itself, 4) by the interactions they had with their friends, and 5) by their degree of interest in the material. All these factors came into play in influencing the interpretation which a child arrived at after reading a story.

It is clear to any classroom teacher, that a study of this nature involves a high degree of cooperation between the researcher and the teacher. Although the teacher was herself not directly involved in much of the data collection in this case, her cooperation was crucial to the success of the study.

Study 5: Bean, Singer, Sorter & Frazee (1983). Direct Instruction in Metacognitive Strategies.

This study is an example of the kind of research which can be done when teachers collaborate with researchers. One of the authors of this study, Jack Sorter, is a classroom teacher of tenth-grade world history. In the study, the investigators wanted to find out whether outlining and graphic organizers (structured overviews, diagrams, and flowcharts) helped high school students better comprehend textbook materials, and further to find out which of the two strategies was more effective in doing so.

The teacher, Mr. Sorter, instructed his students over a twelve week period in the strategy of developing graphic organizers after reading their history texts. Two classes received this instruction; one of the two groups had previously received instruction in writing summaries of history texts. A third groups received instruction in the traditional strategy of outlining. The investigators found that on subsequent quizzes, when either the graphic organizer strategy or the outlining strategy were required of students, comprehension was equally facilitated. When they looked at later quiz scores,however, when no strategy was required of students, they found that students who had received the graphic organizer instruction scored significantly better. This indicated that students were more apt to use the graphic organizer strategy of their own volition than they were to use the traditional outlining strategy.

When the investigators compared student attitudes regarding the two strategies they found that students had significantly more positive attitudes about the graphic organizer strategy than they did about the traditional outlining strategy. Since attitude toward strategies strongly influences the use of strategies, this is a finding which teachers can fruitfully apply to their classroom situations.

The investigators went one step further and examined the effectiveness of these strategies on material which was very challenging to the students. When the students were required to summarize that material, the researchers found that the graphic organizer strategy was more effective than the outlining strategy in facilitating summarizing; when students had previous experience in summarizing and had instruction in developing graphic organizers, their summaries were significantly better than those of students who were instructed in the traditional outlining strategy alone. The writers report that students using the outlining strategy often complained that they had difficulty in knowing how to begin their summaries.

This study demonstrates a number of things to potential teacher-researchers. First of all, it is an example of a study in which a teacher was an active participant in the research undertaken, and in the presentation and publication of that research. Secondly, it demonstrates the kind of information which can be gained from longer-term research in the field; a one-shot, short-term study strategy instructional session and subsequent test of its effects would have yielded meager information. Strategies are learned over time, and consistent instruction in these strategies is what this teacher study provided.

Study 6: Anderson, Evertson & Brody (1979). An Experimental Study of Effective Teaching in First-Grade Reading Group.

This study was conducted over a period of one school year and involved the cooperation of 27 first grade teachers, each cooperating throughout that entire period. The purpose of the study was twofold: 1) to measure the effectiveness of 22 principles of reading instruction which were thought to be important, and 2) to investigate the extent to which teachers actually carried out innovative methods of instruction.

The 22 principles of instruction included things as diverse as consistent signalling to get the attention of students to appropriate responses to students' reading problems, and were reported in terms of 55 separate scores. Significant differences were found in some cases and in some cases were not. What is of interest here are the conclusions of the study, which were made possible by the length of time over which the study was undertaken and by the extent of teacher cooperation.

Teachers were observed throughout the year in order to ascertain whether or not they were indeed carrying out the intended instructional strategies. This was important since the results of the study, i.e. the effects of instruction, depended upon that instruction actually being implemented. The researchers found from their observations of the teachers that no all the instructional strategies were being implemented, nor were all being implemented consistently. Furthermore, among the teachers in the control group, who had not received training in the 22 principles of instruction, many were using some of those practices as part of their own instructional approach. In short, the long-term observations of teachers enabled the researchers to evaluate more realistically their findings regarding student achievement and instructional principles. They were able to temper their claims with an unusually rich bank of information regarding what actually happened in the classrooms.

This type of research clearly requires exceptional dedication on the part of both researchers and teachers in order to document the goings-on in classrooms. The results, however, while inevitably less cut and dried, reflect more closely what is actually occurring in our schools.

A CLOSE-UP VIEW OF THE TEACHER AS EXPLORER

The following passage (Clyde,1985) is based upon fieldnotes kept by a teacher-researcher who is engaged in research in her classroom along with a professional researcher. It demonstrates the way in which the teacher-researcher explores instructional strategies and maps out future paths to follow.

"Susan Gibson, a special education teacher, has formed a collaborative research partnership with Julie Wheeler, a doctoral student from Indiana University to investigate literacy in learning disabled youngsters. In doing so, she has accepted the responsibilities of a full-fledged researcher. Armed with a field notebook and pen, she documents literacy events in her classroom, recording kids' responses to activities, reflecting upon more successful and less successful language encounters, and generally subjecting her instructional decisions and theoretical assumptions to constant and careful scrutiny.

"Since the study began in January, Susan and Julie have together initiated many new experiences which have challenged them to keep a close eye on not only the students, but themselves as well. In sharing her teaching responsibilities with Julie, Susan has begun to take a new look at herself, to compare and contrast their two very different styles while Julie has begun to understand the complexity of moving from research to practice.

"Perhaps the biggest eye opener of all has been the success of a letter exchange with college-aged penpals. For 90 minutes after her students received their first letters, Susan witnessed a genuine interest and participation in real literacy. Students shared the letters they received with each other and with the teacher, they composed letters together or shared ones they had composed with other students, and they put a lot of effort into making nice envelopes for their return mail. Neither Susan nor Julie found themselves prompting them or trying to keep them on task. The students were geniunely absorbed in the experience.

"Not long afterwards, on a day on which Susan had sole charge as both teacher and researcher, she attempted another activity with her class, one which she felt, on the basis of her discussions with her research partner, had much in common with the popular penpal project. Students were to check out books from their newly planned and created classroom library and read them in groups or alone, as they chose. Through Susan's fieldnotes, we join the children, their first experience at uninterrupted reading already in progress.

> 'Susan: "Michael and Shawn. Remember, you were going to sit together and read your books."
>
> Shawn holds a book in each hand and starts swinging around like a windmill. Shawn and Michael go back to the cubby, and their heads pop up, "Matthew, you wrote bad words in here."
>
> Matthew (angry): "What?" (Goes over to cubby to see what they are talking about.) "I didn't write that."
>
> Shawn and Michael (teasing sound to voice): "Oh, yes you did."
>
> Michael starts making various noises like loud snorting and then comes out of cubby with his books.
>
> Susan: "Michael, I want you to come back to your own seat now and read your book."
>
> Michael: "I hate to read books."'

"The scene continues, with Susan concluding her field notes with a memo to herself, a list of questions which she feels must be addressed by both her and Julie.

> 'What we need to discuss:
>
> What are our goals for this library time?
> If our goal is for them to read and they won't voluntarily, what are our alternatives?
> What aspects of the penpal experience made them so eager to read?
> How are library books different from the penpal letters?
> Are we presenting the library books too soon?
> Do we need to make books with them first?'"

Susan was engaged in the exploration of a new instructional strategy in her classroom. Teachers find themselves in this situation frequently in the course of their trying to nurture the growth of their students. Susan's situation was special in that she was making a self-conscious attempt to document her exploration of a new strategy and the result of its use with her class. It is this documentation of a planned exploration of an instructional strategy which constitutes research into classroom instruction.

IMPLICATIONS FOR TEACHER-RESEARCHERS

The studies which have been discussed in this chapter demonstrate several things to the classroom teacher. First and foremost, they demonstrate that research into reading comprehension as it occurs in action in classrooms is highly dependent upon teacher-researchers. Without the extensive cooperation and involvement of classroom teachers, rigorous field research is impossible.

Teachers who wish to pursue their role as researchers can make particularly useful contributions to reading comprehension research by basing their research on the strengths of their position within the classroom: 1) Teachers have the opportunity to plan, undertake, and modify instructional strategies in their classrooms. 2) Instructional strategies can be incorporated into normal classroom life and are thus not seen as disruptive, unimportant, or irrelevant. 3) Instructional strategies which are developed over time can be pursued, thus broadening the type of instruction which can be investigated. 4) Since the length of time of the study is, as such, not a crucial factor in investigation for a teacher-researcher, hypotheses arrived at early in a study can be verified and refined through further modification and testing of the strategy in question.

In summary, teacher-researchers should capitalize, for purposes of research, on their power within the classroom to legitimize instructional activities, on their daily contact with learners, and on the extended periods during which they have contact with the same group of learners.

CONCLUSION

In this discussion of the overall findings and of specific examples of research being conducted in improving reading comprehension, I have argued that teachers have an important role to play in furthering our knowledge of this important aspect of learning. Teachers need to see themselves as explorers. They, more than anyone else in the field of education, have the opportunity to observe children, to draw hypotheses regarding children's learning needs, and then to investigate those hypotheses in their own classrooms. Teachers can invite the collaboration of professional researchers in making their insights known, or they can take it upon themselves to develop their own abilities to communicate their findings in public forums such as journals and conferences. There is much to learn about how children learn, and teachers are closest to that process in action.

IDEAS FOR HOW TO BEGIN

Two national organizations which have made it a priority to encourage research by teachers in their classrooms, either in collaboration with professional researchers or independently, are: 1) The National Council of Teachers of English, and 2) The International Reading Association. Each offers grants to teacher-researchers and provides advice regarding proposal writing and regarding the research process itself.

There are a number of publications which are eager to receive articles written by classroom teacher-researchers. Some of these are:

The English Journal
Language Arts
Livewires
State IRA journals
Journal of Reading
Learning
The Reading Teacher

If you have a research idea but would like to collaborate with a professional researcher, contact the Education Department of a local university or college. Collaborative research projects with other teachers in your school or in your district can be a rewarding and enriching experience as well.

Chapter 11

MEETING AT THE CROSSROADS:
MEASUREMENT IN RESEARCH AND IN CLASSROOMS

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INTRODUCTION

The assessment of reading comprehension is a fundamental concern of both teachers working with students in a classroom and researchers studying the reading process. As soon as a new group of students enters a class, the teacher begins to assess their reading comprehension. This assessment of the reading provides information for planning instruction and for setting goals for individual students. For the researcher studying reading comprehension, the development or choice of a measurement instrument is one of the most critical decisions the researcher will make. In both the instructional and research setting, the method chosen to measure reading structures, if not determines, what will be perceived and what will be valued.

This paper contrasts the assessment of reading comprehension in research studies with that which goes on in classrooms across the country. While differences between research and practice will not be ignored, the focus will be upon the search for a common ground on issues related to assessment. I will argue that there can be a "meeting at the crossroads" in the area of assessment between researchers and teachers. I will conclude that collaboratively the perspective of the researcher and the perspective of the teacher can serve a self-corrective function relative to future work in the area of reading comprehension assessment.

We are all aware of the emphasis on group assessment, particularly the use of standardized achievement tests and minimal competency tests. No one can deny that often the scores on these tests are inadequately and inappropriately interpreted both within and outside the educational field. The test results are often used for purposes never intended by the test developer. Johnston (1984) argues that our present testing paradigm with its emphasis on group assessment must be challenged because it is based on simplistic if not faulty assumptions. Since we know that the comprehension process is complex and multidimensional, the assessment of that process must be likewise complex and multidimensional. We now know that assessment results are not only affected by the test, but also the strategies and knowledge that the test taker brings to the testing situation. One test score provides only one indication of the reader's abilities. A single test score provides a single perspecive on comprehension. The collaboration of researchers and teachers in the area of assessment could lead to challenging current practice and thus affecting the current status quo in reading and assessment.

I do not dismiss the fact that assessment is often used for different purposes in comprehension research studies than it is in classroom and school programs. Researchers choose a method of measurement which will further delineate the process of comprehension. In contrast, assessment in schools provides information for making decisions about students and programs (Pearson & Johnson, 1978). School assessment is often used for the comparison and classification of students. Assessment in schools ranges from the individual assessment of a student to the evaluation of a system-wide program. Yet despite these surface structure differences, I will argue, all assessment of reading comprehension shares the ultimate goal of improved instructional practice.

I will discuss three areas related to assessment in this paper. First, I will discuss assessment from a research perspective. This review is based on a data bank of reading comprehension studies published from 1974 to 1984, gathered as part of a federal contract. Second, I will discuss classroom assessment. The issues discussed in the first section will be refocused and considered from a practitioner's point of view. A third section will take a close look at an actual instance of what classroom assessment looks like when it incorporates new insights in the measurement and assessment of reading. A final section will summarize the key issues drawn from both research and practice for purposes of explicating a future agenda.

The purpose of this paper is not to discuss or review all the complicated issues involved in the area of measurement and assessment. Others have discussed many of these issues in detail (Farr & Carey, in press; Johnston, 1983; Johnston, 1984). Rather, I am reviewing how assessment is used in research and in classroom settings, emphasizing the need for teachers and researchers to share their expertise with each other.

Like research and instruction, assessment needs to be theory driven. I take the position that ultimately any assessment in reading takes as its goal the improvement of instruction. To fulfill that function assessment must be focused on the individual and situated in particular contexts.

MEASUREMENT IN READING COMPREHENSION RESEARCH

Research in the area of reading comprehension has changed and expanded tremendously over the past ten years as researchers have tried to define reading. Reading is viewed as a cognitive process and research has moved from a product to a process orientation (see other papers in this volume by Harste, Rowe, and Short). However, this expansion of our knowledge base about reading has not affected the measurement area, in either research or practice, as significantly as one would expect. While reading researchers generally do not view reading as an information transfer, many assessment instruments are still based on this premise.

As a result, assessment does not always reflect current understandings about reading comprehension. "Research findings of late have tended to emphasize the importance of process over product, yet educators and researchers persist in depending on the more conventionally obtained product data" (Johnston, 1984, p. 175).

This partially results from our inability to really measure the actual process of reading. Since reading is a mental process, it is diffiuclt to develop measures which will expose that process. "Our ability to study the process of reading has not kept up with our good intentions; and we are forced to resort to the product as an index of the process" (Farr & Carey, in press, p. 19).

Even researchers who are studying the higher level processes of reading and cognition in general choose more product oriented measures (see Short, Chapter 7, in this volume). There still remains the need to identify assessment strategies which effectively measure the reading process as defined by researchers in the field. This search for new methods of assessment has led some to study reading in more naturally occurring situations. It has also encouraged the use of nontraditional types of measurements. These issues and others will be discussed in the section which follows.

Issues in the measurement of comprehension

A review of reading comprehension research reveal several issues related to the measurement of comprehension which merit discussion. These include: (1) the kinds of measurements used in comprehension research, (2) the development and use of new nontraditional types of measurements, (3) the use of experimenter developed measures of comprehension, (4) the use of multiple measures of comprehension in a single study, and (5) the relationship between the type of measurement and comprehension gains.

Kinds of measures used. Many different kinds of measures have been used in research studies to assess comprehension. These include a very diverse group of measurement instruments ranging from vocabulary tests to methods of analyzing whole texts. The use of instruments which measure small units of language appears to be decreasing, while the use of tests or instruments which measure larger linguistic units are increasing. This is not surprising since a great deal of recent comprehension research is now focusing on understanding how readers process texts, rather than how they deal with smaller units of language.

There are several kinds of measures that are typically used in research studies. The kind of instrument used most frequently to measure comprehension ability has been a set of comprehension questions. This type of measure includes multiple choice questions, true-false questions, and open-ended questions among others. The use of questions as a measure of comprehension has been a consistent choice of many researchers over the past ten years partly due to their efficiency and ease of use.

In one study, a multiple choice test, developed for use in the study, consisted of seven incomplete statements, one why question and one sequencing question. All of the nine items were followed by a list of four to six words or phrases from which the student was to choose the answer. The test was designed to measure the student's literal and inferential comprehension. Two forms of this test were used in the study (Kameenui, Carnine, & Freschi, 1982). Assessments of this type are also an integral part of classroom assessment practices.

Retellings, recalls, or summaries have also been a common choice of researchers, although their use has varied from year to year. The analysis of this type of measure is very time consuming.

An oral recall task was one of the measures used in a study by Graves, Cooke, and LaBerge (1983). These recalls were transcribed and a propositional text base was constructed for each passage. The propositions in each recall were matched to the propositions in the text base and counted.

Another type of analysis of oral recalls was used by Hansen (1981). The recalls in her study were analyzed for the prevalence of inferences. Three forms of recall were considered, including textual information, scriptal information (knowledge the student brought to the reading process), and intrusions (knowledge considered extraneous to the task by the researcher). Each study using recalls or retellings as the measure of comprehension seemingly structures the analysis and interpretations of the recalls somewhat differently.

The use of cloze tests and vocabulary tests as a measure of comprehension has been less frequent than the measures previously discussed. A study by Sampson, Valmont, and Van Allen (1982) used two types of cloze tests and a vocabulary test along with a reading comprehension test. The cloze tests were scored by a semantically consistent scoring system. The number of different responses which were considered acceptable were also tallied.

Phonic tests, reading rate tests, and miscue analysis are not common measurement choices of researchers doing comprehension research. While this may not have been the case throughout history, it is, nonetheless, true of reading comprehension research during the past 10 year period. In many ways this is unfortunate as much, seemingly, could be gained by addressing what really constitutes a "miscue" in terms of a retelling following the reading of a selection.

Norm-referenced measures are tests in which an individual's score is compared to the scores of other individuals. Tables of norms are prepared by the test developer. These tables are based on scores that are obtained on an appropriate group of subjects (Borg & Gall, 1983). These types of tests are infrequently used in comprehension research except in some of the classroom instructional studies. In these studies norm-referenced achievement tests are given for the purpose of defining general group achievement levels. For example, Tharp (1982) used achievement tests to compare the experimental group, in a special reading program (KEEP), to control groups classrooms (see Dahl in this volume for further discussion of this successful program). Apparently, for most researchers, norm-referenced tests do not assess those behaviors which they see as central to understanding comprehension. This is one area where research and practice follow very different paths. Schools strongly emphasize the use of norm-referenced tests, usually group achievement tests, for monitoring comprehension abilities.

A review of the kinds of measures used in comprehension research indicates two other trends. The kind of measures used in the special education comprehension studies did not differ significantly from those with nonlabelled students (see Stephens in this volume). Secondly, the measures used by researchers in classroom instructional studies did not usually differ from studies which do not include some type of comprehension instruction.

Use of nontraditional measures of comprehension. Nontraditional or nonstandardized measures of reading comprehension have also begun to appear in research studies. These methods reflect newer orientations toward comprehension and acknowledge the complexity of the reading process and of extralinguistic factors that influence the reader and affect comprehension. Hu-Pei Au and Mason (1981) used videotape analyses of class participation structures to study the relationship between participant support structures and reading achievement. Weaver (1979) used tests on sentence anagrams in her study of the effects of sentence organization instruction on comprehension. While nontraditional measures are still not widely used, their use is increasing.

As we have mentioned, there is still a search for measures that provide more information about the process of reading. Protocol analysis is a method typically used by researchers studying problem solving, in which an individual thinks aloud as he solves a problem. Some researchers consider that this type of measurement provides information about the process of reading, while minimally interrupting the reader. Olshavsky (1977) and Kavale and Schneider (1979) used protocol analysis in their studies related to readers' use of specific strategies. Hare and Smith (1982) used two methods of self reports, retrospections and protocol analysis, in a study of the metacognitive reading skills of children in elementary school.

Recently, some researchers have been using written texts produced by students as indicators of reading comprehension. Such measures include the analyses of written summarizations of text passages as in the study by Hare and Borchardt (1984). The use of writing as a measure of comprehension appears to be increasing. We can probably expect more development in this area in the future because there is more attention devoted to studying the relationship between reading and writing.

As researchers better understand the reading process, new methods of measurement can be expected to be developed. The integration of new methods of assessment with established methods will provide a more complete profile of a reader's comprehension abilities.

Use of experimenter-developed measures. Many comprehension research studies include a measure of comprehension which has been developed by the experimenter. In a study by Linden and Wittrock (1982), the senior author developed two types of posttests for each of the stories used in the study. The first was a multiple choice test of factual information and the second was a completion test of reading comprehension. The tests were rated by three judges based on the relevance and/or congruence of each test item to the story. Criteria were also developed by the authors for use in judging the type of generations the children produced. The researcher developed tests in this study are typical of many in the data base that were reviewed.

Use of multiple measures. Operating with the assumption that reading involves a group of strategies whose requirements change according to the demands of the literacy event, researchers are trying to assess these multiple strategies. Studies are seldom structured to measure only one skill or behavior; rather, many researchers used multiple dependent measures to test multiple hypotheses. Researchers acknowledge that different types of measurement yield different results and interpretations of the competence of the reader. "Generally it is considered better to assess ability using a variety of tasks as sources of information, since each provides different information" (Johnston, 1983, p. 69). With the use of several different measures of comprehension, the researcher is able to develop a more complete picture of the reader's comprehension strategies and competencies. For example, Raphael and McKinney (1983) used comprehension questions, a free recall measure and a reading achievement test in their study on question-asking behaviors.

Researchers tend to choose the type of comprehension measure which will most likely provide them with information related to the aspect of comprehension which they are studying. As we reviewed comprehension research, we found that researchers are using a continuum of measurement instruments which ranged from structured to open-ended. They triangulated the results of these assessments to better understand the comprehension process. They chose product type measures and measures that are more process oriented. We can use both types to provide a more comprehensive profile of the reader. Winograd (1983) used several diverse types of assessments in his study. Included in his study was a word list test, multiple choice questions, summaries of test passages, ratings of the importance of each sentence to the text, and short answer interview questions. His measures represented both structured and unstructured types of measures.

Special education comprehension research studies also tend to use multiple measures. In a study by Wong and Jones (1982) on the self questioning behavior of learning disabled and normally achieving students, five measures were used. These included the number of idea units underlined in test passages, the number of on-target questions generated by the subjects, the performance on reading comprehension questions, a recall measure, and the time required to complete the assignment. These measures also represent a range of measurement instruments.

Measurement and comprehension gains. The results of comprehension research studies do not differ when classified according to the kind of instrument chosen to measure comprehension. The one exception is that studies using measurements that are not norm-referenced report more positive comprehension gains as compared to studies using normed measures.

A Summary of the Trends

Although the area of assessment has not always reflected the most recent theory and inquiry in the field of reading, there are several issues which indicate changing perspectives. A review of the kind and type of measurement methods used in reading comprehension research over the past ten years indicates several trends. These include: (1) the use of assessment methods which measure larger linguistic units, (2) the development and use of new nontraditional types of measurement, (3) the use of experimenter-developed measures, and (4) the use of several types of comprehension assessment in a single study, rather than reliance on one method of assessment. Researchers are using several assessment methods in an individual study ranging from structured to more open-ended types of measurement. Since comprehension is not a unitary skill, it is unlikely that a valid assessment of the process can be made using a single measure.

CLASSROOM ASSESSMENT AND MEASUREMENT

This section attempts to reconsider and refocus the trends discussed in the first section from the perspective of the practitioner. Specifically I will discuss: (1) the kinds of measures used in classroom assessment, (2) the development and use of new nontraditional types of measurement in classrooms, (3) the use of teacher developed measures of comprehension, (4) the use of multiple measures for assessing the comprehension of a student, and (5) assessment and classroom instruction. Assessment in schools is affected by many extrinsic factors as compared to assessment in research studies. This both complicates assessment issues and poses barriers to change.

Kinds of measures

Teachers use many of the same kinds of measures in their classroom as are used in research studies. Theoretically quite divergent measures tend to be mixed and matched in most school settings. Teachers commonly use both individual and group types of assessments. Individual assessments include informal assessment and observational methods. Oral questioning, commonly used as part of reading instruction, is typically focused on the individual rather than the group.

Group measures include criterion-referenced tests developed for use with a reading series and norm-referenced group achievement tests. Group achievement tests in schools are an efficient and cost effective method of evaluating a large group of students, thus they are widely used. Some school systems also use skills tests related to assessment of minimal competencies. If the types of measurement used in classrooms were categorized according to the classification we considered for research studies, the latter three types would mainly be classified as vocabulary and comprehension questions. Practically, what this means is that many important aspects of reading comprehension are not being assessed given current classroom assessment procedures. Informal assessment is the main type of school assessment which considers a process oriented perspective on the reading process.

In special education classrooms assessment practices tend to be more individually oriented. Individual norm-referenced achievement tests and criterion-referenced diagnostic tests are often used by educators working with both the gifted and the learning disabled. Special education teachers do tend to know more about assessment because teacher training programs in special education commonly include a course on assessment or diagnosis. The orientation toward assessment from a special education perspective tends to focus on the learning problems of the student. These assessments are supposed to indicate areas for individual instruction, although many of the instruments do not seem to have a close correspondance to the tasks that children are asked to do during instruction in reading comprehension.

In contrast to research, the choice of assessment methods in schools tends to be atheoretical, that is, the decision to use a specific type of assessment is not based on any instructional theory. Assessment decisions are often made by individuals other than teachers. Thus, there often is a helter-skelter approach to assessment in classrooms, rather than a choice of assessment methods based on a theory of learning and the plan for instruction in a specific classroom.

It seems clear that school-based assessment, like assessment in research, needs to include measures that are more process oriented. For example, an important area of comprehension research has been the investigation of metacomprehension abilities. This refers to the skills by which the reader monitors his own progress and analyzes the demands of individual tasks. While metacognition is an important area of inquiry in research, the assessment of metacognitive skills of readers is rarely included in school programs.

An example of such research is a study by Raphael and McKinney (1983). They studied fifth and eighth grade students' awareness of information that was explicitly stated in the text, or implied by the text or from the student's own knowledge. They considered how this awareness affected the ability to answer questions. A training program was organized to prompt students to consider these three relationships between the question and the source of information used to answer the question. Training was found to be effective for both groups, while prompting was only effective for younger students.

Research information of this type could easily be included in classroom reading instruction. Unfortunately, teachers are often unaware of new information in the area of assessment. This and other insights in the assessment of reading comprehension need to be communicated to practitioners.

We would be naive to ignore the fact that some measurement methods used in research studies are inappropriate in their present form for use in the classroom. Many research instruments require complex implementation procedures, one-to-one administration, and time consuming analyses of the results. Since teachers have limited time to devote to assessment, the measures are unrealistic. Researchers should consider devoting time to adapting such measures for use in classrooms.

New types of assessment

New kinds of assessment methods need to be introduced to teachers, particulary those assessment procedures which highlight strategic behaviors in the reading process. Assessments procedures which can both be used to teach and to assess and measure progress at the same time appear to have the most promise.

Writing has been used as a measure of comprehension in research and is also appropriate for use in practice. Stotsky (1982) describes writing strategies which can be used not only for assessment, but also for teaching comprehension. She suggests writing activities including dictation, reproduction, paraphase writing, precis writing, and sentence combining. Stotsky describes each exercise, offers some suggestions for implementation in the classroom, and then focuses on why the exercise is effective for improving the student's reading and thinking.

The assessment of metacomprehension abilities along with the teaching of these strategies might be another of promise. Bean, Singer, Sorter, and Frazer (1983) investigated whether the use of outlines or graphic organizers helped the students to better comprehend textbook materials. The students learned strategies for comprehending, while their comprehension abilities were being assessed. Geva (1983), planned to improve reading comprehension by requiring students to develop a flowchart representation of a paragraph. The author proposed the use of flowcharting as a means of assessing and teaching less skilled readers to understand the structure of the text.

Another new assessment perspective is that of "negotiated testing." In negotiated testing the teacher observes how the child performs independently on an assessment task of the teacher's choice. The teacher then compares performance in this setting against performance in a setting where assistance -- either adult or child — is provided. In this way the student's "zone of proximal development" is identified. This zone, according to Vygotsky (1978), represents the area where instruction would be most beneficial. Feuerstein calls this type of assessment "dynamic assessment" (Brown & French, 1979; Feuerstein, 1979, 1980; Johnson, 1984; Vygotsky, 1978). These views of assessment are important because social interaction and support is considered a part of the process, not as separate entities apart from instruction.

Teacher developed assessment measures

One of the bright spots in classroom assessment is the use of informal assessment and observation. These observations often do focus on the process of comprehension rather than on the products of comprehension. The individual teacher's methods of informally evaluating a student's progress probably provides more information on the comprehension abilities of a reader than any test score. But these observation are usually never "synthesized and reported" in any manner (Farr & Carey, in press).

Teachers have developed a repertoire of methods to assess the student. But they often tend to consider this assessment from more of an intuitive perspective rather than as a systematic and complex method of gathering information about the student's comprehension abilities. Teachers' observations are too often not sanctioned. We need to place more emphasis on these assessments. Teachers must reassert themselves as experts and decision makers and renew their confidence in the knowledge they possess about their students. The tremendous base of assessment knowledge that teachers possess is an area that also needs to be explored and considered by researchers. Informal assessment methods often effectively demonstrate the influence of the many factors that influence reading comprehension.

Use of multiple measures

Earlier I reviewed the use of multiple measures of comprehension by researchers. The purpose of using multiple measures to assess reading comprehension is to provide a variety of quality information about the reader's use of reading strategies associated with successful performance. While practitioners do use a variety of assessments, there often are no instructionally based reasons for the assessments that are used. Certain tests are often mandated for use and these test scores are often emphasized above other information about the reader. Due to administrative mandates and time constraints, it is easy to place too much emphasis on the accuracy of one test score as an evaluation of the reader's comprehension abilities. This seems particularly true at the upper grade levels where there is less small group instruction. Teachers have less individual interaction with students and a limited number of opportunities to assess the students. As researchers have found, the profile of a student's competencies can be very different based on the testing situation and the type of tests that are given.

Researchers have studied different assessment situations and considered how a student's behavior varies according to the measure used. A combination of information seems to be essential to provide a more accurate assessment of the comprehension processes that are used by the reader:

> ....A fair proportion of the problems might be solved by taking a broader perspective on reading comprehension. Standardized tests have generally restricted our thinking to product-type tests when

we should be more concerned about comprehension processes and metacomprehension (Johnston, 1983, p.68).

When using normed tests, researchers are suggesting that one needs to look for the reason behind the response given by the student on a particular test question. This is usually only possible if one individually asks a student about his reasoning for a specific response. Langer (1983) studied the comprehension processes that readers used to understand test questions on norm-referenced tests. She reported that some readers chose an incorrect response that was based on "interpretations that are contextually acceptable" (p. 15). The readers had logical explanations for their interpretation of the meaning of the test passages. Langer concluded that "standardized tests do not measure the processes involved in the construction of meaning from a text nor do they evaluate an individual's ability to manage these processes" (p. 33).

While it is not the intent of this paper to extensively discuss the area of norm-refererenced measurements, there is a need for teachers to be more aware of the relationship between reasoning and response types and to decrease their over reliance on any one single test score. Norm-referenced testing should be considered as only one type of measure used to evaluate competencies. In addition, researchers and teachers need to more fully study the situational and background factors that affect test performance.

Measurement and classroom practices

Assessment can affect classroom practice in both positive or negative ways. Assessment which is an integral part of classroom instruction informs the teacher about the reader and indicates areas for study. In most classrooms, assessment is not considered separate from instruction.

However, assessment concerns can be emphasized over instructional concerns. In classrooms and schools where the test performance is the primary goal of instruction, reading instruction tends to look like a series of continuous tests. One only has to hear students' negative comments about reading to see the effects of such curriculum practices. Reading is equated with vocabulary drills and the reading of short passages followed by multiple choice questions. Movement toward such classroom practices can often be influenced by factors outside the school itself where individuals do not understand the appropriate use of these instruments. We do not want high standardized achievement test scores to become the goal of our curriculum. At most they are but one indication of a reader's performance.

The Measurement Challenge Ahead

Classroom assessment, like assessment in research studies, is complex and multidimensional. We need to focus on reading as a cognitive process, rather than as a product represented by a test score. The concern for assessing an indivdual should be emphasized above group measurement concerns. More than one measure of comprehension should be used to obtain a more accurate idea of a reader's ability. Finally, new assessment methods which focus on the reading process need to be implemented in the classroom. The use of strategies that provide both instruction and assessment of comprehension need to be further explored.

Changing assessment practices in schools is more difficult than changing research practices. Decisions in schools (unlike the situation for researchers) are influenced by factors outside the confines of the classrooms. One area where we might begin is the area of informal assessment. Teachers, building upon their developed expertise in informal assessment methods, need to reassert their rightful role as instructional decision makers. We will now look at a teacher who uses assessment in a constructive and innovative manner to provide more appropriate reading instruction for her first grade students.

TOWARD A PRACTICAL THEORY OF ASSESSMENT

Mrs. Winters, a first grade teacher, has a well organized reading program where the students are challenged based on the assessments that she uses in her classroom. She discussed how she used a variety of assessment methods to develop a profile of the reading competencies of each student. Her use of assessment is an integral part of her theories about learning and the type of instructional environment she believes is most effective. Her reliance on her own expertise and judgment is evident.

Mrs. Winters related her use of informal assessment and observation when a new student entered her room in mid-year. She commented how she had asked David to "sit in" on each reading group and to participate in the story discussions. She observed his reading with different types of reading material, such as trade books, the basal reader, classroom displays, and information presented at learning centers. Mrs. Winters also considered other behaviors which many don't typically consider as reading behaviors. She watched David for indications of maturity in following classroom routines and participating in activities. She observed the way he wrote a story and evaluated his expression of ideas and his use of conventions. She talked with him about reading, and then, after several days of observation, decided on the strategies and reading skills that were appropriate for him at that time.

She commented that she rarely used standardized test scores for instructional planning. She related, "My judgment is better than the information I get from the standardized achievement test. It really just verifies what I already know about the student." She related a classroom situation to illustrate her perspective. Julie, one of Mrs. Winters' students, had just finished a story about a dolphin who was trained to rescue [illegible]derwater researchers. After finishing the story, Julie said, "He (the dolphin) is kind of like a lifeguard."

In order to make this response Julie had to recast what she had read in terms of her own personal knowledge of the world. Many researchers see this sort of metaphorical/analogical reasoning as a key process in literacy use and learning. Mrs. Winters had observed a demonstration of Julie's comprehension that few existing comprehension tests measure.

Mrs. Winters maintains a reading and writing folder for each child in her classroom. These folders contain samples of each child's work along with Mrs. Winters' observations about the child's progress. The reading folder lists the books the child has read independently and the reading strategies and skills which are being emphasized in the class. There are also more personal, informal comments which also indicate the child's attitudes about reading. The reading folder also contains samples of the student's work ranging from a worksheet to a drawing of the main idea of a story read in class. The writing folder includes samples of the student's writing and a list of the writing skills which are used consistently and those which are being worked on in the class.

Mrs. Winters is certainly an example of a teacher who uses highly tuned observation and informal assessment techniques. When you listen to her description of a student, you are convinced that she has an accurate picture of the whole child as a reader, not merely his performance on a checklist of reading skills. Mrs. Winters uses a variety of assessment measures, ranging from the standardized achievement test to her observations of the child, to inform herself about the reader. Her use of assessment is integrated with her instructional techniques, such that any activities she engages in with her students provides her with more information about their competencies.

ASSESSEMENT: MEETING AT THE CROSSROADS

Many might say that the roads of research and practice rarely intersect. As teachers, it is easy to believe that reseachers do not understand the daily constraints and factors which make the assessment of reading comprehension only one of the many factors that they have to contend with each day. I believe that researchers have information to share with teachers, and that teachers, as developers and users of assessment in instructional situations, have ideas to share with researchers. There can be a "meeting point" where the perspectives of each group are shared and considered. Below I summarize key differences between the perspectives of teachers and researchers for purposes of clarifying key issues in assessment.

(1) The choice of a measurement instrument by researchers is usually theory driven, while school based measurement practices tend to be eclectic and hence atheoretical.

(2) Researchers usually develop their own measures, while teachers tend to use more standardized measures due to time constraints and administrative directives.

(3) Teachers use assessment in more naturally occurring contexts, while researchers use assessment in more controlled situations.

(4) Researchers do not use norm-referenced achievement tests in many recent comprehension studies, while the use of these tests are strongly promoted in school programs.

(5) Teachers and researchers both use multiple measures to assess comprehension. Researchers tend to use a combination of measures which range from structured to open-ended types of measures.

(6) Both teachers and researchers are interested in identifying more valid methods of assessing the process of reading comprehension and what growth looks like from such a perspective. Both teachers and researchers have turned to the use of informal assessment and observation techniques in this search. Often, however, product and process measures are hopelessly confused in both current research and practice.

Suggestions for Implementing Changes in Assessment

The profession has reached the crossroads and now has to decide the direction it will take in the future. Below I suggest some areas that I consider important for improving assessment perspectives and practices.

(1) We need to consider a new paradigm for reading comprehension assessment oriented upon the individual reader as learner. "The bottom line is that we need to worry more about the assessment process in the individual, and about the process of assessment in context" (Johnston, 1984, p.175). Such a focus also acknowledges the multiple factors that influence the testing situation, particulary the background and strategies brought by the student to the testing situation.

(2) Researchers have long acknowledged their right to choose and even develop their own comprehension measures. This same right needs to be exercised by teachers. Teachers should be decision makers in using published tests and in developing their own informal measures of comprehension.

(3) The teacher's expertise with informal assessment and observation, developed through experience and knowledge about language learning, needs to be sanctioned. The results of such informal assessments need to be used by teachers in a more direct and systematic way.

(4) Researchers need to communicate the new research information concerning the effect of extra-linguistic factors, such as cultural background and experience, on reading comprehension (see Heine, Chapter 9, in this volume). All teachers are well aware of how these factors critically affect the child's performance in the classroom. They need to know how to more effectively assess these factors and use them as an integral

part of instruction.

(5) There needs to be more consideration given to the assessment of critical reading involving the use of different types of print settings and materials. Such assessment must include visual materials, graphic materials, computerized text, and more.

(6) An exciting perspective for practitioners is the use of reading strategy lessons as assessment situations which not only promote the development of the reader, but also provide a picture of his or her competencies under varying conditions. Recent research in writing and metacognition provide possible areas from which new strategy lesson assessment settings could be developed.

(7) Teachers and reseachers need to consider "negotiated testing," a procedure that allows teachers to see how the student performs independently as compared to a setting in which assistance is available. Such settings acknowledge the social nature of language and can potentially lead to new understanding of test taking behavior and response patterns.

(8) Given the political reality of the use of norm-referenced group achievement test and minimum competency tests, both researchers and teachers need to inform decision makers about the appropriate interpretation of test results and prevent the gross misuse of these tests. The content of these tests should not guide our curriculum. School test-taking skills are important, but not the basis of a functional reading program.

CONCLUSIONS

In this paper I have summarized the trends in measurement resulting from an analysis of reading comprehension research studies from the past ten years. I reviewed issues and trends related to the assessment of reading comprehension from the perspective of the researcher as well as the teacher. An underlying assumption has been that the direction and assessment interests of researchers and teachers can serve to improve assessment practices if we but learn to collaborate. The issues of measurement are like many others in the field of reading — multifaceted and not easily resolved. My tour of reading comprehension assessment has indicated areas where reseachers and teachers might find a "meeting place." This tour has pointed out some "new roads" that could be taken. Changes will only occur as both teachers and researchers work together to develop more valid measures by which we can assess the process of reading and its role in learning.

PART IV: SYNTHESIS AND ASSESSMENT

Chapter 12

PORTRAIT OF A NEW PARADIGM: READING COMPREHENSION RESEARCH

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INTRODUCTION

I wish to argue, based on my involvement in a state-of-knowledge and state-of-art assessment of reading comprehension and reading comprehension instruction, that a significant conceptual change is occurring in reading. To give a concrete instance of what this change means in terms of instruction, I quote Debbie Goodman, a teacher at the Burton International School in Detroit. An entry she made in her journal captures the changes that she, her students, and other teachers in her school are making as they rethink reading and retake ownership of their instructional program in reading:

> When I speak to parents, I tell them that my first goal is to connect each child with a book. They nod their head in agreement. It does not seem to them such a radical idea. I have learned, and am still learning how to make my classroom an environment where children may learn and may discover print. I know how to keep meaning, purpose, and message intact when I teach; so that connections between writer and reader are not lost....When I began at Burton three years ago, the classroom book corners had been crowded out to make room for DORT, a mastery learning system, [that had been] mandated by a Detroit judge. This year most of the rooms have classroom library corners and several teachers have balanced the basal with literature. Many teachers are doing journal writing, letter writing, and other regular writing programs....These small in-roads came about because we [fellow teachers, university researchers, parents, students, etc.]...began to support each other......In Fiddler on the Roof, one of Sholom Alechem's characters began a proposal of marriage by saying: "Can I ask you a political question?" "How is marriage a political question?," the girl wanted to know. "Everything is a political question," he said. Perhaps it is. But it is a personal question too. For when mandated reading programs drive literature out of the classroom and deny children their connection with the rest of the world, then we, as teachers, students, parents, writers, and readers are drawn into a political battle. We must take a stand for books and for children.

While the changes in beliefs and in instruction which Debbie Goodman manages to record in this journal entry are more characteristic of some groups of reading researchers and teachers than others, to simply state that the conceptual landscape in reading is changing, is, at best, an understatement. Jimmy Britton (1984) calls what is happening in both research and instruction "a quiet revolution." The last two sentences in Debbie's journal suggest that while Professor Britton may have been right in calling it a "revolution," he may have been wrong in calling it "quiet."

In fact, I wish to argue that nothing less than a paradigm shift is occurring in reading. By this I do not mean to suggest that a new paradigm is replacing an old paradigm. Rather, what I mean is that a new paradigm is evolving. In the social sciences paradigms rarely replace each other; rather the old and the new live side by side.

To support my contention that a paradigm shift is occurring I will trace three major shifts in the assumptions which undergird recent research in reading. On the basis of these shifts I will outline 15 key characteristics of the paradigm I see evolving. I postulate that in the decade ahead teachers and researchers will spend most of their time sorting out one or more of the issues associated with the characteristics of the new paradigm.

CHANGES IN ASSUMPTIONS AS EVIDENCE OF A PARADIGM SHIFT

Thomas Kuhn (1963) suggests that revolutions in science come about as the result of breakdowns in intellectual systems; breakdowns that occur when old methods won't solve new problems. He calls the change in theory that underlies this kind of revolution a "paradigm shift."

This paper argues that a paradigm shift is occurring in the field of reading. Because of this shift, it is an exciting and significant time to be involved in the field of reading. If Kuhn is right, such shifts involve fundamental changes in the assumptions researchers are testing relative to reading.

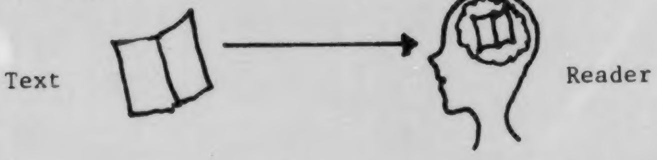
Given the characteristics of recent research and my study of the hypotheses being tested by reading researchers over the past 10 years, three major trends can be identified. For purposes of discussion, I have labeled these trends (1) from transfer to transaction, (2) from submission to signification, and (3) from convention to collaboration. These trends are overlapping and interrelated. They reflect, I believe, our profession's changing view of reading, language, and learning, respectively.

From Transfer to Transaction

Understanding the Profession's Changing Views of Reading. Historically, reading researchers began studying reading using an information transfer view, or model, of reading. More recently, I am arguing, they are coming to hold a transactional view of reading. The shift from transfer to transaction covers a good deal of conceptual territory. Figure 1 describes the characteristics of each of the dominant views of reading comprehension. It is designed to give the reader a conceptual overview of the territory affected by the profession's changing view of reading and the roles that text, readers and meaning play in each view.

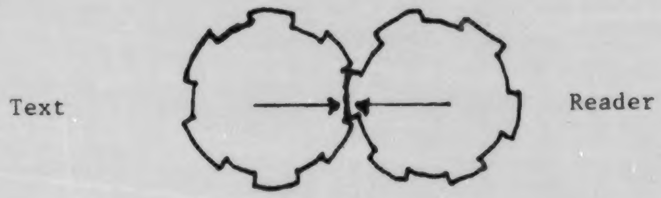
Figure 1
Some Characteristics of Various Views of Reading Comprehension

Information Transfer



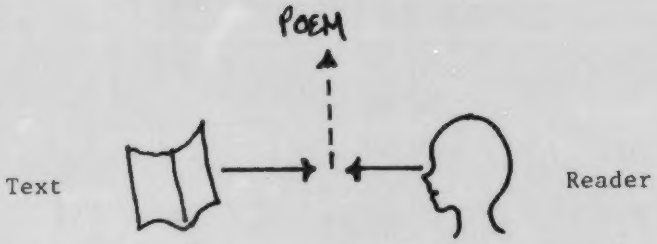
- Meaning is in text
- Reading is a process of transferring meaning from text to reader
- Key variables in this process are reading skills
- Good readers transfer more information than poor readers
- The criterion for judging reading success is how much information was transferred

Interaction



- Meaning is in the text and in the head of the reader
- Reading is a process of these two meaning systems interacting
- Key variables in this process are reading skills and text organization
- Good readers interact with text differently than do poor readers
- The criterion for judging reading success rests upon our knowledge of what strategies an ideal reader would have used given these text features and/or reading conditions

Transaction



- Meaning is relative; the result of a reader coming in contact with a text in a particular context; meaning is assumed to vary across readers as well as within readers across settings
- Reading is a process of interpretation; it is assumed that various readers will give various interpretations; it is also assumed that readers of a particular culture will have a shared meaning by virtue of the fact that they are members of the same interpretive community
- Key variables in this process are culture, socio-historical context, experience, and the history of literacy which the reader brings to the setting
- Good readers use print to successfully explore and expand their world; learning ought to be the criterion for judging a successful instance of reading

Reading has been viewed as a process of information transfer. In the process of reading, information in the text is transferred to the mind of the reader. Under an information transfer view of reading, the text reigns supreme, the reader and the reading skills of the reader are seen as being the major variable. Good readers differ from poor readers in the amount of information that is transferred during the process of reading.

Currently the most popular view of reading is what I would call interactional. An interactional view of reading sees the reader and the text as each contributing to the reading process. What knowledge and background experience the reader brings to the text is important. Texts, however, may be either "considerate" or "inconsiderate." Both the reader and the text are the focus of research. Various outcomes are expected in that no two readers and no two texts are alike. Persons who hold an interactionist view of reading talk as if the text has a meaning independent of the reader. One of the notions they talk about is "dual texts," meaning "the text or document that was read," and "the text or meaning that was created in the head of the reader" as a function of reading.

Schema Theory as Evidence of Trend. Strong evidence supporting the argument that a shift has occurred in fundamental assumptions relative to our thinking about reading — from transfer to interaction, at least — is the recent swing to schema theory (Anderson, Spiro, & Montague, 1977; Spiro, Bruce, & Brewer, 1980). The number of studies produced during the past 10 years that entail a schema-theoretic perspective is overwhelming. Because of the centrality afforded the reader under a schema theoretic view of reading, one can even predict with some certainty which text (cohesion, propositional structure, organizational structure, etc) and task (functionality, text type, lesson frameworks, etc.) variables will be studied in preference to others. For the most part schema theory represents a distinct shift of attention from the text to the reader. What readers bring to the process strongly affects what they get out of the process. The reader, rather than than the text, is center stage.

Inferencing -- essentially a reader-based activity (e.g., Rumelhart & Ortony, 1977) — wins a popularity contest in terms of hypotheses currently being explored in the name of reading comprehension. More studies (32) are coded as having a dominant focus on inferencing than on any other processing strategy. Most of this work looks at inferences which can be drawn from textual information, and contrasts such inferences to those that can be explained only by positing the active involvement of the reader in the process. The dominant assumption is one of interaction, i.e., the reader contributes some things, the text contributes some other things. Rather than looking at the reader as a faulty vessel that gets filled up, as information transfer theories were wont to do, the dominant view of reading today is interaction, which Goodman (1984) metaphorically likens to two gears meshing -- the reader and the text touch, but then both go their separate ways.

The new paradigm I outline projects transaction rather than interaction as the assumption which is emerging in reading. Transaction assumes that the reader, in conjunction with the text, produces "a poem," to use Rosenblatt's metaphor (1978), which stands above the reader text plane. A transactional view of the reading process essentially says there is no going back (Carey, 1984). The product of asking a reader to try to retell everything that was read is a new event larger than the sum of its parts (what the reader brought, what was present in the text, and what meaning the text took on as a function of someone having viewed it in a particular situational context).

In contrast to an interactional view of reading, a transactional view of reading sees the coming together of reader and the document read as resulting in a single "text" but this text is, to use the phrasing of the transactionalists, "a new event." This new event can neither be explained by examining the document read, nor by knowing the reader. The process of reading transforms both the reader and the document that was read. When transactionalists are shown that the document read really exists and that it physically did not change, they argue that this isn't true. Given different contexts, documents take on new meaning. Meaning, argue the transactionalists, is always a relationship between text — the document read — and context, and does not exist independent of someone's interpretation of that relationship.

Whereas the dominant metaphor driving the study of inferencing from an interactional viewpoint is an "ideal reader" who would make all the necessary inferences to fully comprehend a text, a transactional view is interested in "real readers" and sees texts as open systems of meaning that vary by historical context as well as by the history of literacy which the reader brings to the reading process. (See Tompkins, 1980, for a developmental look at how the field of literary criticism has changed relative to this point).

Complexity as Evidence of Trend. In some ways the various views of reading sketched above parallel and reflect history. One characteristic of the trend in how we have viewed reading — from transfer to interaction to transaction — is that each view entails an ever more complex and sophisticated view of what is involved in reading.

As general evidence that reading comprehension research reflects the trend I have talked about, I cite the fact that one of the significant characteristics of research published in the last ten years is its complexity. Because most studies involve multiple variables, my colleagues and I found that each instructional intervention, for example, needed to be coded in terms of text, task, reader, and processing strategy manipulations for purposes of description. Many research articles these days present multiple experiments designed to sort out complex rival hypotheses. Rarely are single hypothesis, straight-line cause and effect studies being published. In fact, in our meta-analysis data base (157 studies of the 573 studies synthesized), only 27% of the effect size scores came from studies which made only one comparison. Not only do most studies test multiple hypotheses, but most also use more than one dependent measure to assess the difference between treatments. Ninety-two percent of the effect size scores included in the meta-analysis came from studies employing more than one dependent measure.

Recognition of the complexity of the reading process is further reflected in the statistics used in instructional research. MANOVA, regression, canonical correlation, and multivariate statistics typically replace T tests and analysis of variance.

A transactional view necessitates a participant rather than an outsider view of reading as a meaning-making process (see Smith, 1984). Researchers studying readers must assume that the reader has a theory of how and what kind of meaning is appropriate given the particular circumstances in which the reading process is occurring, and further that what the reader is currently doing — no matter how dysfunctional or inappropriate it may seem to us as an outsider — is adaptive from the perspectve of the reader involved. It is the researcher's job to map this theory of meaning that is in place.

Under a transactional view, reading and reading comprehension can mean various things because what these activities are and what they mean rests with the definitions that readers give them as they engage in reading in different settings. In one study of first grade reading, one of the readers involved made 27 attempts to sound out the word "hippopotamus" (Rhodes, 1979). The reader never did manage his goal, but finally just went on. After the child attempted to retell everything that he could remember about the story, the researcher interviewed him in an attempt to understand his beliefs about reading. One of the questions she asked was, "Do you think you are a good reader?" The child's response surprised the researcher given the very hesitant reading of the story the child had produced, "Yes...I try to sound out all the words."

As is evident from this example, the child's theory of reading — in that it excludes the notion that one has to make sense — is different from what we, as teachers and researchers, think of when we think of reading and reading comprehension. Under a transactional view of reading, meaning is open. While members of a common interpretive community will share some meaning by virtue of social history, each reader will also have his or her own idiosyncratic interpretation. In some instances, such as the example cited above, reading can be defined by a single first grader (or even, we have found, a group of first graders) to be something quite different than the definition the teacher may have thought he or she was teaching.

While there are not many research studies that have been done purely from a transactional point of view, several researchers began with an interactional view of reading and were led to a transactional view of reading in order to explain their data. My projection is that more and more studies will be done from a transactional view of reading in the future.

One study conducted from a transactional view of reading is Galda's dissertational study (1982) of three readers reading various texts. This study shows that interpretation is a function of reader more than a function of text. Galda studied 3 readers' interpretations of 3 texts. She found that each reader's personality strongly influenced how each text was perceived, what characters would be important, and what the story meant.

Crafton (1981) sees reading as involving both text meaning and reader meaning. It isn't simply the case that readers must have the right background of experience in order to have a good reading experience. Reading, Crafton argues, is its own experience. The act of reading is generative in that it helps learners explore, expand, and appreciate their world in new ways. While how much background information a reader brings to the process affects what will transpire during reading, not having the "right" background information does not preclude the reader from having a useful and productive reading experience.

Hayes and Tierney (1981) explored analogy as a strategy by which readers might improve their comprehension. They asked readers to recast unknown materials in terms of something more familiar. They found that readers recasting one experience in light of another experience (using what they knew about baseball to conceptualize the game of cricket), reported discovering relationships and having understandings other readers did not make. Analogical reasoning, as a reading strategy, was generative, allowing readers to go beyond what they knew and what was in the text itself.

Methodological Shifts as Evidence of Trend. Quite predictably, paralleling the move from interaction to transaction, there has been a shift in research methodology (Carey, 1980; Green & Bloome, 1983; Herzfeld, 1983; Kantor, Kirby, & Goetz, 1981; Mischler, 1979). Researchers have abandoned standardized measures of reading in favor of multiple choice comprehension measures which more directly tap the cognitive operations that they are studying and which they suspect are not being clearly tested using a standardized reading test. Only 5% of the effect size scores in the meta-analysis were generated by standardized measures. While there are several possible reasons why researchers may have turned to other types of measures, one possibility is that standardized tests measure products of reading but do not measure what researchers think are key processes to be explored in studying or understanding reading comprehension from the perspective of the new paradigm. In addition, retellings ("tell me everything that you can remember about what you have read") are much more frequently used to generate comprehension scores and subscores (24% of the time in our meta-analysis data), even if these later are broken up into idea units (called propositions), the idea units assigned to types (main line ideas, qualifiers of main line ideas, conjunctives between main line ideas, etc.), and the frequency of types subjected to statistical analysis to see if they differ in type as a function of one or another reading condition.

While experimental studies still dominate, many more naturalistic studies are being conducted. This methodological move is further evidence of the paradigm shift. Rather than reporting data in terms of statistics which focus on generalizable and abstract trends, theoretical memos which focus on concrete differences between treatments and which cover topics such as "friendship groups," "shared commitment," and "reading as its own experience" are becoming more prevalent. Theoretical memos as a way of reporting on the research experience allow researchers to talk about their own involvement in the research process as well as interactions and transactions that they see occurring in reading instruction.

This trend in how to report reading research has caused problems for the major journals in the field. While editors would like to publish articles reporting ethnographies of reading, the length and style of the writing in such articles breaks convention. Experimental researchers on the editorial boards of most professional journals have many problems with this research. To them it seems impressionistic. One corrective measure that one now sees is that the editorial boards of major journals are being expanded to include researchers who have conducted ethnographies and are sympathetic to the length and writing style demanded by this research tradition. This move on the part of editors is in itself evidence of the paradigm shift. Editors would not change unless they felt that current editorial policy was against the shift in perspective occurring in the field of reading.

Similarly, an "Erlbaum Phenomenon," for lack of a better term, has occurred. Book publishers, who are willing and able to publish longer pieces, are competing with professional journals by guaranteeing rapid turn-around time. Heinemann, IRA, Harvard University Press, Indiana, and others have begun publishing untraditional dissertations which essentially do not lend themselves to the statistical reduction of a professional article as was the case in a former era.

While the shift from transfer to transaction is far from complete, I cite the complexity of current research and the moves to schema theory and ethnography as evidence of shifting beliefs in the field. These shifts are important to watch as they represent a shift in basic beliefs and definitions as to what is reading. Nothing could be more fundamental or more exciting for the future of a discipline.

From Submission to Signification

Understanding the Profession's Changing Views on Language. It takes both readers and writers to create a revolution. Language in use -- speaking/listening, writing/reading -- is a form of social action. The opportunity to standardize language -- to make one's own dialect the "standard" dialect -- is an instance of social and political power.

Ever since the invention of the printing press there has been a tendency to want to freeze language, that is, standardize its spelling, its grammar, and other aspects of form. Often this trend is couched as being motivated by the desire to facilitate communication among and across various readerships of a language. Today English contains many silent letters which in a former era were pronounced, i.e., "knight," "gnat," etc.

One way to conceptualize the changing trend in how we view language is to see that, with the advent of printing, language became an object of study in and of itself. Linguists shifted their attention from oral language (which of course varied from language group to language group) to written language. Written language was a better medium to study because with the advent of the printing press it had become more stable. The result of this work led linguists to identify the rules of how language worked. They concluded that it was highly systematic and organized. Sentences which followed these rules were deemed grammatical. The linguist Noam Chomsky did more than anyone else to map the rules of language, and in fact developed a "transformational grammar" which attempted to explain how language worked. If an utterance didn't follow these rules, it was considered "ungrammatical" or "wrong." "Correct" English was English that followed the rules of transformational grammar. Once these rules were developed for written language they were used to judge the grammaticality of oral language utterances.

The fact that most oral language and a good many of the newer written language changes were by these rules "ungrammatical" began to bother many people. These linguists argued that a theory of language that did not explain "language in use" was no theory at all.

When these linguists went to study language as it was being used by storekeepers, street people, workers, and others, one of the things that they found was that language was extremely complex. In fact they found that the meaning of an utterance could not be totally understood by just studying the language or wording of the utterance. In order to map the meaning of an utterance, linguists had to take into account nonverbal aspects of the event such as gesture, situational context, shared knowledge, and other types of communication systems that might be present. These linguists began to talk about language as the act of signifying meanings with a variety of signs. Some meaning in a language event could be assumed. Some meaning could be assigned to context. Some meaning could be allocated to gesture. Some meanings could be assigned to language. These linguists became interested in the process by which groups of people decide to agree that such-and-such gesture, such-and-such a word, etc., will mean such-and-such. They refer to this process of how groups collaboratively learn to mean as the process of signification. They see understanding this process as central to understanding the process of literacy and literacy learning.

This change, however, has been recent. Under either a national preservational or Chomskian view of language, as might be expected, language became restrictive. Children were taught the rules of "proper" English. A good share of English time in schools was spent attempting to get children to abandon ungrammatical forms they had picked up from their home or community. Language, rather than being viewed as an ever-changing, ever-malleable tool to be shaped by the language user, became something apart, something one was suppose to do "correctly" or not at all. While most speakers found that they had to "submit" to proper English -- that is give up some of their preferred oral language forms in order to be successful in school -- this view was particularly hard on dialect speakers. Given the number of changes they were asked to make in order for their English to be declared "standard," it was difficult for them not to feel that the English they spoke was "wrong" and that their parents, by teaching them this English, were not good Americans.

A second major shift in assumptions underlying research in reading comprehension relates to these changes in the profession's view of language. I considered labeling this trend "from authority to authorship," but rejected that label because it fails to capture a growing recognition of the multimodal dimensions of language in use. Language has been viewed by proponents of the old paradigm as a closed system, something one submits to, something to be policed. In terms of comprehension, the attitude has been that words are a key meaningful unit of language and that reading is a process of chaining the standard meaning of English words together. Paralleling this belief was the assumption that if a reader could properly pronounce words he or she could read -- in the sense of comprehend -- and that reading (associating particular meanings to words) would remain constant for the individual across time (from childhood to adulthood). A good index to the difference between a proficient and a not so proficient reader, by this view, was the size of a reader's sight vocabulary.

Under the submission view, reading was seen as a skill which needed to be practiced to be perfected. Deviations from text were not to be tolerated. Reading, for the most part, was viewed as a restrictive process, even more so than language generally, because it was thought to involve a second-order abstraction over and above oral language processes like listening and speaking. Oral language was easy, written language was hard. The difference between learning to use written language as opposed to oral language was a process of decontextualization; that is, readers and writers must learn to attend to cues within language proper rather than making use of the supportive contextual cues as they did when learning to talk and listen. Writing instruction was delayed until after the language learner had learned how to read, as reading was seen as a prerequisite to writing. Reading comprehension was seen as the end result of reading. Reading was best taught by working on lower-level skills like decoding and word recognition initially, bringing these to automaticity, and via this process freeing the mind to attend to meaning or higher-level processing skills.

Today a submission view of reading is being held by fewer and fewer specialists in the area of early reading, though it is still quite prevalant in content area reading where it is often assumed that there is a body of information that needs to be transferred and that therefore the model is more viable at this level. Even here, however, the dominant view is changing. Because the facts that schools taught — Newton's laws; atoms are the smallest things in the universe; etc. -- have been found faulty, many content area specialists today believe that the focus of study in their discipline should be upon "process." They advocate that study in their discipline should focus on how the process of science works, not on the particular content or "facts" that process generates at a particular moment in time. Science they argue proceeds on the basis of belief, not fact. Belief often looks like "fact," but is essentially thought at rest. They advocate developing critical readers who question fundamental assumptions while reading and actively use reading and writing to test out hypotheses in order to grow.

Early Evidence of the Trend. The individualized and language experience approaches to reading (see Van Allen, 1976), advocated in the two decades prior to this research study, strongly challenged the assumptions underlying a submission view of language. More recently, but still also a decade prior to the focus of this review, miscue analysis (Goodman, 1976) and instructional cloze (Bormuth, 1962) were attempts to recognize that reading was an instance of language in use and hence more open and amenable to variation than the predominant view. Miscues were defined as observed responses which differed from expected responses in text (Goodman & Burke, 1980). Omissions, substitutions, and insertions which did not change the meaning of the text were considered reading strengths, as opposed to weaknesses, in that they showed evidence of the reader actively applying what it was he or she knew about language and the world. The cloze procedure, in which readers are asked to fill in every nth word in a passage, was initially scored using the text's surface structure as a template. With the move from testing to instruction, the developers of cloze suggested that the criterion in scoring ought to be relaxed and that any and all words which make sense given the context of the sentence and text be scored as correct. Maze (Guthrie, 1977; Guthrie et. al., 1974), a cloze-like procedure in which readers select 1 of 3 options whenever they reach certain points in the text, can be designed to check on the reader's flexible use of various cue systems (graphophonemic, syntactic, semantic, or combinations of these) as he or she is reading. Each of these trends was an implicit recognition of "the openness of language."

When language is seen as "closed," one (and only one) meaning is acceptable. To say that language is "open" is to recognize the fact that while members of a language community share some meaning, each individual has his or her own meaning for a given word. The word "tree," for example, means something different to you than it does to other members of your language community. Similarly "tree" means one thing to a 3-year old, something quite different for the student who has studied the function trees played in the Westward Movement, and something different even from both these meanings to the city slicker who moved to the country to get away from the city. This does not mean that members of the same interpretive community do not share some meanings, but rather it is an attempt to recognize that language is forever changing. Today words like "gay," "petting," and "cool" have a different meaning than they did at earlier points in our history. Paralleling these insights into language, meaning, rather than word calling, became the focus of reading research.

Reader-Based Studies as Evidence of Trend. During the past ten years this trend has continued. In fact, the trend that one sees is a move ever further and further away from the surface of the text. Miscue and cloze research, while meaning based, are very close to the text. Inferencing is more reader based and moves the study of meaning away from the surface features of the text to the process by which the reader constructs meaning, or makes a unified sense, out of his of her reading. Macro-operators are rules of generalization and deletion which readers systematically apply to reduce text (Kintsch & van Dijk, 1978). Story grammars (Rumelhart, 1977; Stein & Glenn, 1978; Thorndyke, 1977) are mental structures which readers have intuitively discovered as the organizational components of a well-formed story. If, for example, a setting or an attempt is not present in a story read, the reader is likely to add this category when asked to retell the story after reading. Macrostructures and story grammars are not, in a true sense, in the text at all, but rather are a phenomenon in the head of the reader. Metaphorically the trend has been for researchers to step further and further away from the text or document read in their attempts to understand and study key cognitive processes in comprehension.

Clearly the bulk of the research today is on inferencing or the study of comprehension as a function of reader-text interactions, but the larger trend -- the study of comprehension in terms of the cognitive strategies that the reader uses to reduce and store meaning -- is in place. Many researchers studying instruction, for example, are developing programs which help readers learn and apply the macro-operators or strategies readers use to reduce and store information in memory. To date these studies are text-dependent, though there is some indication that researchers are beginning to map strategies successful readers use across a variety of contexts. Other researchers are developing programs which teach children comprehension monitoring strategies. Many of these programs attempt to get children to be consciously aware of these strategies. In some programs children are taught to ask themselves, "Did what I read make sense?," "Did what I read sound like language?" If the answers to these questions are positive, the reader is taught to continue reading. If either question is answered in the negative, the reader is taught to go back and reread.

Interdisciplinary Studies as Evidence of Trend. Not surprisingly, interdisciplinary study has resulted from this broader conception of reading. Today almost all instructional studies in reading comprehension borrow freely from cognitive psychology and linguistics. Many others — and these tend to fall out in camps (it is fascinating to see who quotes whom) — borrow from sociolinguistics. Some borrow from literary criticism. Few borrow from more than one discipline at a time, though this too is changing. Bruce (1979), for example, freely borrows from linguistics, cognitive psychology and sociolinguistics. Feathers (1984) has recently completed a dissertation using perspectives rooted in linguistics, literary criticism, cognitive psychology, sociolinguistics, and reader response theory. While most studies are multidisciplinary rather than truly interdisciplinary, this trend too is changing.

One very healthy change has been a clear attempt by more researchers to trace the roots of their thinking back in time. References to James, Peirce, Dewey, Huey, Rosenblatt, Jakobson, Vygotsky, Piaget, and others abound. What is encouraging is the recent attempt to trace as well as map the history of thought underlying both the old and new paradigms.

Reading/Writing Relationships as Evidence of Trend. The hottest thing in reading, however, is writing. Pearson & Tierney (1984) have argued that in terms of what the mind does, reading and writing bear much in common. Reading, rather than being seen as a process of reconstruction, is seen as a process of construction. The reader doesn't reconstruct the author's message; the reader constructs his or her own message. Shanklin (1982) has proposed a transactional view of the writing process using multidisciplinary work in reading and language as a metaphor for exploring key psychological and sociological strategies involved in reading and writing.

Hansen and Graves (1984) have been actively working in classrooms exploring reading and writing relationships. From a constructivist perspective, both reading and writing involve composing. What is of particular interest is the social process by which objects like print are taken as signs which have the potential to mean and become a communicative convention for a group of language users.

In an interesting mix of reading, writing, and comprehension, Rosen (1985) and Wells (1985) recently reported working with readers using a technique they call "storying across the curriculum." In the videotape footage I saw, children were involved in a social studies unit. Once a selection was read, children were encouraged to create their own personal story of what they thought the selection meant. From group discussion this activity led to writing personal narratives in which the children were asked to put themselves in the time frame being studied and retell history from the viewpoint of the characters they developed. While this data is just now being analyzed, the personal involvement and the depth of understanding displayed by the children on videotape was exciting. I strongly recommend that readers follow this work closely.

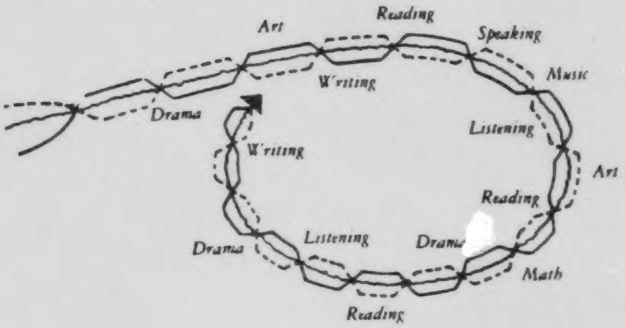
An Expanded Definition of Literacy as Evidence of Trend. While texts were initially seen as meaningful configurations of language intended to communicate (De Beaugrande, 1980), they are now being seen as meaningful configurations of signs intended to communicate (Siegel, 1983). Researchers began by mapping language structures in text. Today they are mapping language and nonlanguage systems like how pictures, graphs, charts, and other aspects of format contribute to and, together with print, sign the meaning of the text. This has led to new interest and insights into the manner in which illustrations and other textual devices semantically support and facilitate text comprehension.

De Beaugrande (1981) identifies 7 key characteristics of text which not only apply to the texts we read, but also to the texts we write: cohesion, coherence, intentionality, acceptability, situationality, intertextuality, and informativity. From De Beaugrande, it is a short step from this notion to the assumption that these characteristics are strategies (search for a unified meaning, never assume nonsense, make the text you create fit the context you are in, etc.) that successful readers and writers use in text interpretation and production.

Strategies such as these have as much to do with learning as they do with reading. It is not not surprising, therefore, that reading and writing in a system of knowing become topics of exploration (see Harste & Mikulecky, 1984). The issue becomes, "How and in what ways are the reading and writing processes similar or different from the learning process?" The multimodal nature of text production and comprehension gets renewed emphasis (Harste, Woodward, & Burke, 1984; Sadoski, 1983, 1984; Siegel, 1983). Sadoski and Getz (in process) study mental imagery as a semantic system in its own right that operates in conjunction with written discourse or print but which facilitates the reader's attempt to create a unified meaning and plays new cognitive roles in comprehension. Siegel (1984) asks readers to draw a picture of what the story meant to them. She sees the process in which these readers are engaged, not as a simple moving of information from one communication system to another, but rather as a recasting of their knowing, and this very process of projecting meaning on a new content and expression plane as what real literacy and its study is all about.

In some ways the trend from submission to signification is a trend from seeing reading as an independent freestanding skill to seeing reading as a process of learning within a system of knowing. Figure 2 conceptualizes the process of reading within the process of learning. Today, researchers studying reading comprehension are suggesting that teachers present reading to children as one of several process tools learners have available to them for transforming what they know and what they currently believe. Writing, speaking, listening, art, music, mathematics, and dance are seen as other processes or tools which are available. Reading, they suggest, should be presented to children as a vehicle by which learners reperceive, reassess, rethink who they are and what they believe in their coming to know. As a function of involvement in the reading process, learners are different than they were when they initiated the process.

Figure 2
Reading in the Learning Process



This shift from submission to signification represents a significant change in the profession's view of language. This shift has important implications for instruction. Rather than teach children to perfect reading as a skill so that they might carry it around and use it "appropriately" as the time arises, reading is seen as valuable only when in use. One doesn't learn how to read and then read to learn. The focus of reading instruction, these educators argue, ought to be upon learning, not reading per se. Children, right from day one, should be involved with books. Reading and writing should be presented "naturally" as children continue to explore new worlds.

Initial moves in viewing language as a process of signification began when reading educators advocated integrated language arts programs (essentially parallel play in which the skill taught in reading could also be taught in writing, speaking, and listening). Today the emphasis is on fusing reading and writing across the curriculum, and the abandonment of a fragmented curriculum. We trace the onset of this change in our view of language — from submission to signification — as having begun with the language experience and individualized reading movements in reading. Major indices of this trend have been miscue analysis, instructional cloze, reading/writing connections, and a renewed interest in mental imagery and the multimodal nature of literacy use and learning.

From Convention to Collaboration

Understanding the Profession's Changing Views on Language Learning. The third major shift in basic assumptions in reading research is best characterized as one moving from convention to collaboration. Whereas the shift from transfer to transaction refers to changes in assumptions relative to reading, and the shift from submission to signification refers to changes in assumptions relative to language, the shift from convention to collaboration is meant to capture a basic shift in the profession's view of learning.

Specifically, this trend is a shift in how we view language learning: from language learning as acquisition to language learning as evolution. If, for example, language could be frozen and the rules mapped, then the process of language learning would be a matter of simply picking up or acquiring the language that is already in place. Under this view, the role of the language user is seen as passive. The learner doesn't change the language; his or her job is to adapt to the system that is already in place.

There are, however, alternatives to this view of language learning. I am arguing, in fact, that the shift in the profession is away from viewing language learning as a passive activity to a more active one.

Rather than seeing language learning as simply a matter of acquiescing to the conventions of language, the current view is one of collaboration. Each language learner has to learn language from the inside out. While clearly the language spoken in the language user's interpretive community is the language learned, each language learner has to reinvent the rules of language for him or herself in the process of learning language. When this view is applied to reading, it means that no one can tell another reader how to read. The reader has to invent or reinvent the rules him or herself. Up to this point, the process does not appear collaborative.

But, of course, language learners are not on their own in this process. They can attend to some aspect of language that interests them, formulate an hypothesis, test it out, and then get feedback from other language users as to whether or not the hypothesis was tenable. If the young child, for example, thinks he hears his mother say to his father, "Get me some coffee," and his father gets up and puts the dog out, he knows he's made a mistake. No one has to tell him. The social context and his social involvement with other language users is all the feedback he needs (Smith, 1980). Up to this point, however, the process may appear to be more one of social coercion than collaboration.

To view language learning as collaboration is to see language learning as a socio-psycholinguistic process. Psycholinguistics is the study of cognitive strategies that individuals employ in learning and using language. Socio-psycholinguistics (by placing socio first) accents the social nature of the language learning process. Under a socio-psycholinguistic view of language learning, the learner is seen as active. Not only do language learners make language their own, but in this process they endow language with their own birthmarks. Each of us, for example, have our own pet phrases, our own pet idiosyncracies, our own peculiar use of words. Because of the social nature of language, some of these idiosyncracies get picked up, and the original meaning of the word is expanded. There are always two forces at work in language. One is towards convention — meaning maintenance; the other towards expansion — meaning generation. Both processes, however, involve groups of language users and collaboration among and between the members of the group.

"O-Meat" in our house means bologna. We never use the word "bologna," though it is one of my son's favorite sandwich meats. In fact it was his calling bologna "O-Meat" when he was very young, and convincing us that it was a better term than bologna, that resulted in its use by members of our family. Whether or not the term will catch on in an ever-expanded interpretive community remains to be seen, though at this point our son has managed to get some of his friends to use the term.

While all three of the trends — from transfer to transaction, from submission to signification, from convention to collaboration — are moves away from subject/object dualism (i.e., looking at language as if it exists apart from use), the abstraction of language and hence its reification is the problem accented by this trend. Convention is seen as fact, something inherent in language itself, something given, something outside and above any particular interpretive community of language users (see Fish, 1980). It has become sort of a free-floating standard. Concepts such as "correctness," "appropriateness," and even to some degree "proficiency" and "competency" reference anchor points in the "ideal" rather than the "real" language user (Halliday & Hasan, 1980). In order to talk about language using these terms, the speaker needs to see him or herself above it all. These are "outsider" rather than "insider" views of language learning.

Under the convention view of language learning, growth and development in language was equated with growth and development toward convention. Conventions, or standard forms — rather than the collaborative process by which conventions arise and are maintained — were seen as fixed. The tenacity of this position is still quite evident, as most developmental continua in language, even today, end with conventional control. That is, while a lot of researchers studying language learning say they are interested in studying the process, they use product measures like "correctness" as their criterion to judge growth.

Changes in Evaluation as Evidence of Trend. Interestingly, until recently, convention was the goal and evaluative standard used to judge and identify a good process language arts curricula, too. To be theoretically consistent, however, process approaches to language learning ought to focus on how readers and writers collaborate to support each other in the learning process and rest their case on these grounds. Having provided children opportunities to experience, see demonstrated, and come to value strategies whereby they might use print (reading and writing) as process tools for learning ought to be the evaluative criteria by which a process approach to reading and writing is judged. To use the acquistion of convention as their yardstick is to mix apples and oranges.

Similarly classrooms cannot be compared against a single instructional criterion or conventional standard. Classrooms are groups of language learners. In some of these classrooms children — even severely labeled children — achieve. In other classrooms children do not. Rather than ask which behaviors by teachers are positively correlated with student gains on tests of achievement, the new comprehension researcher is asking questions of collaboration, "How is it that it can make sense to students to learn in one situation and not in another? What are the teacher and students doing differently? How are these meaning systems created and sustained in daily interaction? What does reading comprehension mean in this classroom as opposed to other classrooms and how do these definitions-in-use relate to morale and what we see as the goals of reading and reading instruction?"

In reality, evaluation is a frontier yet to be adequately addressed by advocates of a process approach to reading. While those in the vanguard talk a process approach to reading and learning, their choice of dependent measures reflects, for the most part, some aspect of convention. However, there has been a recent effort to define the language arts in terms of sociolinguistic and psychological strategies rather than skills. The effectiveness of instructional interventions is beginning to be measured in terms of the child's use of reading strategies (self-correction, self-monitoring, meaning maintenance) rather than in terms of correctness, though these are often hopelessly confused in some research studies. While the definition of "strategy" has not yet been fully specified, it seemingly involves (1) choice on the part of the language user in terms of when it will actually be applied, (2) conscious awareness, and (3) alternatives which are both psychological (that is, things language users can cognitively do by themselves such as monitor meaning) and sociological (things language users can collaboratively do together such as say something about what they have made of what they have read to each other).

Convention is not, by the way, unimportant in a process view of language learning. Rather than the goal, however, convention is seen as a fringe benefit of involvement in the process of language use and learning.

Expanded Print-Settings as Evidence of Trend. Although correctness and convention are in no immediate danger of being abandoned as the sine qua non of literacy, there is some evidence that change is underway. From a collaborative view of language learning, conventions are negotiated and, hence, are dependent upon the circumstances of use. The ability to read does not involve a fixed single skill or ability, but rather a set of negotiated strategies and assumptions which, in their specific detail, vary by the circumstances of use (Kucer, 1982). The strategies used to read narrative text are different from those used to read expository text. Learning to read means learning to use specific strategies for specific contexts under specific conditions. Reading is not a single, huge, monolithic skill which once mastered can be applied to all contexts. Researchers today are testing hypotheses which suggest that reading comprehension would be improved with opportunities to explore various contexts of literacy. Direct reading instruction in reading expository texts, narrative texts, poetry, reference materials, and the like, have replaced the transfer of learning assumption which was in place in the days when only story materials were used as the basis of reading instruction.

The first evidence of a shift in major assumptions relative to language learning probably began with developmental psycholinguistics (see Linfors, 1980, for an excellent review). Child language was seen not as a mutant form of adult language, but a system unto itself, having its own rules and internal consistencies. Dialect studies in the 60's brought new respect for dialect speakers and demonstrated that dialects were language in the sense that they too had a structure that made sense internally. Outsiders might look at dialect as "incorrect" or "bad" English, but the view from the inside was that it was a true language with its own internal structure and rules.

More recently researchers have shifted their attention from oral language to written language learning (Baghban, 1984; Clay, 1972, 1975; Ferreiro & Teberosky, 1982; Heibert, 1978, 1981; Mason, 1980; Sulzby, 1981; Teale, 1978, 1982). Written language is seen as varying by the circumstances of language use

(DeFord, 1980; Dyson, 1984; Heath, 1983; Taylor, 1983). As a result there is renewed interest among researchers in how reading differs across school and nonschool settings (see Harste & Mikulecky, 1984, for a review). While narrative and expository texts are the focus of much comprehension research in reading, predictable books (Rhodes, 1979), journals (Staton, 1980; Vargus, 1982), job materials (Mikulecky & Diehl, 1980), governmental forms (Redish, 1981), and environmental print (Goodman & Goodman, 1979; Harste, Woodward, & Burke, 1984; Heibert, 1978, 1981) have commanded some attention as alternate contexts of literacy worthy of study. Children are said to have gained access to written language long before their reading and writing can be deemed conventional (Harste, Woodward, & Burke, 1984). Meaning is a collaborative process. Conventions are the result, not the focus of language learning. Meaning, rather than convention, is the place where readers and writers meet (see Smith, 1982, for an opposite view).

Renewed Interest in Groups as Evidence of the Trend. Language learning interests such as this have led to renewed interest in context and the social nature of knowing (Brandt, 1984; Carey, Harste, & Smith, 1981). Learning to read now means learning how to negotiate meaning collaboratively in a particular instance of written language use. Reading is an event which entails an ongoing collaborative process of social sense-making. Reading is only one of several language processes — though accented and highlighted — which are available to language learners in the event we call "reading." Meaning is negotiated among the participants in the setting and evolves over the course of the event itself. As a function of experience, the reading experience is constantly evolving as is the criterion for what constitutes successful reading. There is no point at which we suddenly learn to read; rather, each of us continually evolve as readers. There is no point at which we suddenly are successful readers; rather, each reading is best seen as adaptive given the reader's view of what constraints and choices were available in this situation. (In some classrooms sounding out words is adaptive; in others, it clearly is not.)

As a result of such thinking, an instance of reading is labeled a "literacy event" rather than as an act of reading (Teale, 1978). Writers, reportedly, spend as much time reading during writing as they do writing (Atwell, 1980). Things previously considered disruptions, that is, residing outside of the event (like talking with one's neighbor about what one is reading or relating a personal experience), are no longer considered unimportant (Y. Goodman, 1984). Shifts and moves among and between alternate communication systems during the reading event — from reading, to sketching, to talking, back to reading -- are opportunities for readers to shift their stance relative to the text psychologically and sociologically and, in this process, recast and triangulate their knowing (Siegel, 1983). The very complexity of a reading event is said to support the reading process both psychologically and sociologically.

Every instance of reading is seen as social; as a collaboration implicitly or explicitly involving an "allowability contract" (Tierney & LaZansky, 1980). Social theories of reading augment schema-theoretic approaches (Bruce, 1979). Groups and group processes play a new critical role in helping us understand literacy use and learning (Bleich, 1984). Classrooms are social units and referred to as "cultures of literacy" (Bloome & Green, 1982). Logically, the research outcome is a renewed interest in how teacher beliefs, expectancies, and behaviors affect student perceptions of the process (DeFord, 1981).

Renewed Interest in Learning and Curriculum as Evidence of Trend. Calls are made for more classroom-based research (Green & Bloome, 1983), less curricular fragmentation, and theories of learning which incorporate what we know about the social nature of learning (see Harste & Jurewicz, 1985; Harste, Mitchell-Pierce, & Cairney, 1985). The real frustration for many of the researchers advocating the new paradigm is not The Nation at Risk (National Commission on Excellence in Education, 1983) report itself — this was understandable — but rather their own colleagues' capitulation to the report. Advocates of the old paradigm respond by discussing more effective ways to reach old goals, while advocates of the new paradigm want the profession to focus upon new goals for reading and reading instruction based on evolving insights.

The upshot of all of these trends is a renewed interest in learning and curriculum (Eisner, 1982; Mitchell-Pierce, in process; Short, in process). Rather than focusing on reading per se, there is a growing interest in the role that reading plays in a system of learning. The reading event is a learning cycle having self-corrective devices built into the process itself (Scibior, 1984). Educators are reminded that in the final analysis their interest in reading and writing is an interest in learning (see Y. Goodman in Harste & Jurewicz, 1985). Reading and writing across the curriculum becomes a logical movement in that it accents learning and the process of learning. Reading is conceived of as authoring and the process of authoring as one of coming to know or learning. Authoring, in both reading and writing, is posed as a learning cycle that occurs across time. The teacher's role becomes one of support, of helping children shift perspectives (see Shanklin in Harste & Jurewicz, 1985) and thus take multiple perspectives on what they know and in this way learn. Reading and writing are seen as two instances of how readers might shift their perspectives during this learning cycle. The social nature of all learning, but particularly of language learning, is emphasized (Halliday, 1978). Teachers are asked to set up their classrooms so that children have opportunities to experience, see demonstrated, and come to value the strategies associated with successful written language use and learning (see Harste & Jurewicz, 1985).

Practical Theory as Evidence of Trend. Paralleling this change is a renewed interest in classroom-based, ethnographically-oriented research studies. The trend today, regardless of paradigm, is for extended involvement and programs of study rather than isolated studies. Examples would be Pearson and his colleagues' work on inferencing (Gordon, 1979; Hansen, 1979, 1981; Pearson, Hansen, Gordon, 1979; Raphael, 1980; Raphael, Winograd, & Pearson, 1980; Taylor, 1982) and Brown and her colleagues' work on comprehension monitoring (Brown, 1981, 1982; Brown & Day, 1983; Brown, Day, Jones, 1983; Brown & Smiley, 1977, 1978; Brown, et. al, 1983). On the whole, programs of research such as these seem to have a more lasting influence on subsequent research and practice than do one shot efforts. Teachers and researchers are collaboratively studying problems of mutual interest (Pierce, 1984; Mitchell-Pierce, in process; Short, in process). The teacher's curriculum is as much a concern as is the child's curriculum. Teachers are asked to be researchers and researchers to be teachers. Both the National Council of Teachers of English and the International Reading Association have established small grants programs which encourage teachers and researchers to work collaboratively together on problems of mutual interest. Movements which started as calls to move theory to practice have been replaced with calls to develop practical theory.

The emphasis is upon the development of theory based on language in use (Halliday & Hasan, 1980; Herzfeld, 1983). Rather than bringing theory to an atheoretical horde, teachers and children are seen as having adaptive theories that are the result of a negotiated meaning in this context (Smith, 1984). Historically, Goodman (see Gollasch, 1982a, 1982b) and Graves (1983), who both developed process models of reading and writing, will probably not be known for their models of reading and writing, but for having started a movement towards practical theory in their respective disciplines. The upshot of this trend is that the traditional gap between research and practice is not inevitable, but rather as a function of the old paradigm.

Studies such as Pierce's (1984) in which she went to work with two first grade teachers in an attempt to explore the instructional implications of what is currently known about language and language learning, are indicative of collaboration and the trend. Recently Hansen and Graves (1984), well-known researchers in the areas of reading and writing, have joined with teachers in exploring collaboratively a process approach to the teaching of both reading and writing in classrooms. Kucer (1982) won NCTE's Promising Researcher Award for his attempts to develop a theoretically-based curriculum juxtaposing reading and writing.

Despite the fact that some experimental researchers do not see such studies as "hard science," I predict that the trend towards studying language in use — be it reading comprehension, writing, the evolution of literacy, whatever -- will continue. The one thing Graves and other researchers have taught the profession is that by moving from the laboratory to the field, gaps between theory and practice are lessened and teachers see how they can use research to inform practice. Graves's most recent research report is approaching sales of 100,000 copies. Whether the researcher community likes his research or not, he commands a huge audience. Teachers understand his work and come to listen. Without a teacher following, educational researchers have few educators to talk to, regardless of the quality or importance of their work. I predict, therefore, that the trend towards practical theory will continue, as will the trend towards a new methodology for conducting educational inquiry. This trend will win for pragmatic purposes because teachers understand it and know what to make of it, if not initially for academic ones. The result will be a methodology that takes into account the unique, action-oriented demands of doing educational research.

While experimental research has been under attack (see Erickson, 1985), so has ethnography. An ethnographic approach focuses on description rather than on action. Educators must act, they cannot wait until all the data are in. Collaborative research paradigms are being developed (Smith, 1984; Stevens, 1985) which not only describe what is, but which attempt to intervene in the process and thus explore what is possible given changes in classrooms and teaching.

CHARACTERISTICS OF THE NEW PARADIGM

Figure 3
Characteristics of the New Paradigm

1. STRATEGIES <-------- SKILLS
2. SUPPORT <-------- INTERVENTION
3. TRANSACTION <-------- COMMUNICATION
4. EXPERIENCE <-------- STAGES
5. CURRICULUM <-------- FRAGMENTATION
6. COLLABORATION <-------- CONVENTION
7. OPEN <-------- CLOSED
8. SIGNIFICATION <-------- LANGUAGE
9. GENERATIVE <-------- MAINTENANCE
10. TRIANGULATION <-------- STANCE
11. SOCIOLOGY <-------- PSYCHOLOGY
12. INFORMANT <-------- EXPERT
13. PRACTICAL THEORY <-------- THEORY TO PRACTICE
14. LEARNING EVENT <-------- READING ACT
15. POTENTIAL <-------- PROBLEM

Envisioning the new paradigm that is evolving is important. Figure 3 presents 15 key sets of terms contrasting the old and the new paradigm. Advocates of both the old and the new paradigm have difficulty with these terms as the scientific function of these terms is to redefine -- if not often "de-define" -- conceptual ground thought understood. The intent of this paper is to provide a state-of-the-art assessment of reading research for purposes of predicting the future. Since I have decided that the best way to do that is by tracing the evolution of a new paradigm, following are some statements describing my impression of its current characteristics and the "buzz words" being used to set this paradigm apart from its predecessor:

1. STRATEGIES -- It focuses on process, defining reading in terms of psycholinguistic and sociolinguistic strategies, and suggests that the content of instruction be the strategies of successful language use and learning as they relate to reading. Vocabulary and correctness, while important, are not the content of instruction. The difference between a skill and a strategy still needs further clarification.

2. SUPPORT -- It views reading as a disciplined, creative activity that can be analyzed, described, and supported by creating instructional contexts in which the strategies of successful language use and learning can be experienced, demonstrated and valued. While the difference between intervention and support needs further clarification, it is presently being suggested that intervention is to a psychological model of learning as support is to a sociological model of learning. If language and knowledge

are socially constituted, then understanding how it is that language users socially support each other in the reading process is a priority agenda.

3. TRANSACTION -- It emphasizes that reading is a way of learning and developing as well as communicating what has already been learned. Reading is seen as a process by which readers outgrow their current selves. Rather than viewing reading as a process of information transfer with the major variable being a faulty reader, transaction sees the coming together of text and reader as an open potential ever changing as a function of the context of situation and the history of literacy brought to the setting by the language user. The notion of transaction establishes new functions for literacy and new goals for the language arts at the very time when most of the profession is involved in discussing more effective techniques for reaching old goals. It calls for basic research on the further clarification and identification of successful strategies which language users use and teaching techniques whereby learners might experience, see demonstrated, and come to value this aspect of literacy.

4. EXPERIENCE -- It identifies strategic behaviors across all language users regardless of age and posits experience rather than cognitive stages as the key variable in the evolution of literacy. The same language environment that is good for adults is seen as good for children. Because of the pervasiveness of developmental stage theory in terms of the way reading researchers and curriculum developers have looked at assessment and curriculum, much rethinking and reconceptualization needs to be done. Desperately needed is a revised model of learning which incorporates this and other insights into learning.

5. CURRICULUM -- It suggests that in terms of what the mind does, reading and writing share much in common. Both are governed by a search for text in context, both are events that occur in time and space, both are socio-psycholinguistic processes, both are constructive, both open, etc. Instructionally, these insights provide a new perspective on English and lead many to question much of the curricular fragmentation that currently exists in the language arts.

6. COLLABORATION -- Of current interest is not the convention per se, but the collaborative process by which members of an interpretive community invent and establish signs and sign functions. The focus on collaboration is meant to suggest that approaches which attempt to evaluate a process curriculum as if it were a product curriculum have failed and led the field astray. Needed is a focus on the physical and human contexts of literacy and the relationships which exist between and among strategies in these contexts. To be abandoned are current taxonomies of skills which assume the goal of the language arts curriculum is control of language and its conventions.

7. OPEN -- It suggests that literacy is relative, an open potential, dependent upon context of situation. Reading as a strategic form of behavior should be taught so that students understand that in its specific detail the process varies by the circumstances of written language in use. The reading curriculum should help students both understand and expand the heritage and varieties of literacies they are given.

8. SIGNIFICATION -- It is holistic, viewing reading as a multimodal event and one of several systems of knowing. It stresses that a good language arts program expands communication potential, not just the potential to mean via language. It sees reading as a process of signification having much to gain from interdisciplinary study and application. Alternate modes of communication do not compete but rather offer semiotic potentials to mean which vary by the circumstances of language in use and the communication systems available in these circumstances.

9. GENERATIVE -- It highlights the functional nature of literacy both psychologically and sociologically. In so doing it stresses the generative nature of reading as a vehicle for personal and social advancement and adjustment. Guidelines by which teachers might use the school environment to capitalize and facilitate these goals need to be identified.

10. TRIANGULATION -- It teaches strategies whereby students can solve problems and learn how to learn using reading as a tool for learning. While reading is seen as an object worthy of study in its own right, it stresses language in use and sees learning reading, learning about reading, and learning through reading as natural components of every reading event.

11. SOCIOLOGY -- It stresses the inherently social nature of language and language learning. It sees knowledge as socially constituted and calls into question psychological models of learning which ignore the social nature of classrooms and the reading process.

12. INFORMANT -- It stresses the principle that reading teachers should be people who read with children for purposes of providing demonstrations of the strategies involved in successful written language use and learning. Teachers are encouraged to use children and themselves as curricular informants.

13. PRACTICAL THEORY -- It sees research and curriculum development as formal expressions of a process model of learning and calls for a collaborative pedagogy dedicated to the development of practical theory. To be abandoned is the notion that the role of the researchers is to bring theory to an essentially atheoretical horde. Rather, future researchers will assume that from the perspective of the participants involved a theory of meaning is in operation and that what is currently being done is, from their perspective, adaptive. As a function of this perspective, teaching and researching join hands, change places, and, like reading and writing, come to be seen as two names for the same process.

14. LEARNING EVENT -- It sees learning as continuous and the function of curriculum as setting up the learning cycle. It suggests that helping children value the strategies involved in learning how to learn are the real strategies of literacy. It sees reading as a form of logic involving abduction (things to ideas), induction (ideas to things), and deduction (ideas to ideas). It posits anomalies rather than cognitive dissonance as key constructs in learning. Anomalies are seen as transactions which occur as a function of both environmental and cognitive phenomena and include intuition and the search for unsuspected harmonies. It suggests that learners are cognitive animals and that humility and reflexivity are the

hallmarks of literacy in process.

15. POTENTIAL -- It sees the past and future of literacy and curriculum as potentials rather than as problems. Both are opportunities to debug the system by engaging in the learning cycle and, in the process, create rather than live out our future. To fail to rise to the challenge is to fail to understand what real literacy, as it relates both to reading and to reasoning, is all about.

CONCLUSIONS

If science proceeds best under the conditions of tension rather than acquiescence, then it is an exciting time to be involved in reading. The future, like the past, is created, not made.

The three major shifts in assumptions I have traced in this paper permit me to hypothesize that a paradigm shift is occurring in reading. Given my experience with some researchers and teachers, these shifts — from transfer to transaction, from submission to signification, from convention to collaboration -- are more characteristics of some classrooms and programs than of others.

It is important to understand, however, that these conceptual shifts have direct instructional implications. The entry from the teacher's journal I quoted at the beginning of this article alludes to some of the implications of these changes. Recorded in that journal is one school's shift from packaged programs to meaningful experiences with books, from skill encounters to functional reading and writing experiences, and from the role of spectator to participant in the literacy learning process for parents, teachers, and children.

There is, then, much that is exciting about the paradigm shift that is evolving in the profession. If Kuhn is right it will become the norm to the extent that it solves problems the old paradigm could not solve. Since I began by describing the characteristics of the new paradigm, it seems appropriate that I close with its promises:

1. It promises to solve the gap between theory and practice by emphasizing collaboration and the development of practical theory based on language in use rather than the imposition of theory on a supposedly atheoretical populace.

2. It invites teachers and children, as well as researchers, to take ownership of reading. By defining literacy in terms of the mental trips that are taken, it sees curriculum as a relationship and places curriculum development in the hands of teachers.

3. It promises researchers and teachers a new perspective on their knowing, a new opportunity to examine assumptions, a new opportunity to engage in the learning process through reading. Truth is not the guarantee of science nor the guarantee of the new paradigm; but rather, science, and the new landscape in reading comprehension, are a potential for change.

PART V: APPENDICES

Appendix A

SHORT FORM
READING META-ANALYSIS TAXONOMY AND CODING FORM

REFERENCE: Research to Improve Reading Comprehension of Handicapped Students, USOE Funded Research, Indiana University, 1983-85. Co-Principal Investigators: Jerome C. Harste, Pamela R. Terry. Project Director: Philip Harris. This form developed by Jerome Harste, Diane Stephens, Karin Dahl, Deborah Rowe, Katherine Short, David Heine, Sharon Snyder.

PART I

- In all cases, right justify.

Identification

_ _ _ Assigned Number for Study
(to be completed at point of data entry on computer)

_ _ Year of Publication
(enter last 2 digits)

_ Number of Comparisons
(count each Treatment/Control set coded)

_ _ Number of Dependent Measures
(count each subtest as a dependent measure)

Scope Characteristics

_ _ _ Sample Size
(enter total N where N = Experimental + Control)

_ Sex (1=Boys; 2=Girls; 3=Mixed)

_ Race
0 = Not Specified
1 = Minority
2 = Mixed

_ Income
0 = Not Specified

1 = All Low (Inner-City; Disadvantaged; Lower SES)
2 = All High (From Private Schools; Higher SES; Upper Class)
3 = All Middle (Middle SES; Working Class; Middle Class)
4 = Mixed (analysis involves more than 1 group)

___ Achievement Level in Reading
1 = Poor Readers (if Grade Level minus Reading Level is more than 2, or if specified in study)
2 = Good Readers (if readers are on grade level or above, or if Grade Level minus Reading Level is less than 2)
3 = Mixed Group (intact classroom group or sample of good and poor readers)

___ Grade Level
1 = Primary (Grades 1 to 3)
2 = Intermediate (Grades 4 to 6)
3 = Junior High (Grades 7 to 9)
4 = Secondary (Grades 10 to 12)
5 = College (Grades 13 to 13+)
6 = Adult (not in school)
7 = Multiage/Grade

Special Designations

- Code 0 if no specified label appears in report.

___ Identifying Characteristics
0 = Not Applicable (no label appears in report)
1 = Mentally Retarded (Mildly or Moderately)
2 = Learning Disabled
3 = Emotionally Disordered (Behaviorally Disordered)
4 = Hearing Impaired
5 = Other (e.g., Severely Mentally Retarded)
6 = Mixed Special Education Learners
7 = Mixed Regular & Special Learners (Code PLACEMENT 0)

___ Placement
0 = Not Applicable (no label appears in report)
1 = Mainstreamed
2 = Mainstreamed Plus Resource Room
3 = Special Class/School
4 = Other

Implementation of Treatment

___ Duration (number of weeks)

___ External Validity
1 = High (Good Test of Treatment)
2 = Low (Short Duration; Lack Applications)

___ Treatment Personnel
0 = Not Specified
1 = Regular Classroom Teacher (No Special Training)
2 = Regular Special Education Teacher
3 = Clinician (Learning Disabilities Teacher; Remedial Reading Teacher; Reading Resource Teacher)
4 = Experimenter (Researcher)
5 = Other

___ Internal Validity
1 = High (no more than one threat to internal validity)
2 = Low (more than one threat to internal validity)

Control Group Data
1 = Included in Study
2 = Norming Data Used as Control (Includes Pretest as Control)
3 = Treatment Selected as Control

PART II

Description of Treatments

- Code for each treatment group.
- Enter a label for the Treatment Group such that another coder may be able to identify it when he or she reads the report. If possible, refer to tables in report and use label used by researcher.
- When coding Control, label it as such.
- To code Description of Treatment, think of reading instruction as involving 4 aspects: TEXT, READERS, TASK, and PRPOCESSING STRATEGIES. For each aspect manipulated prior to, or as a function of, the treatment, some code must be given.
- Be sure final coding reflects all characteristics by which you might wish to identify treatment and study.
- LINGUISTIC UNIT, MATERIALS, and INSTRUCTIONAL FOCUS should always be coded whether or not they have been manipulated.
- Code DOMINANT FOCUS of various treatments and control in conjunction with each other. To determine DOMINANT FOCUS answer the question, "Which aspect reflects the distinction made in this instructional condition from the others?" Code basal instruction 401.

__ __ Text

- Consider TEXT as the sum of all print used in a treatment. Code TEXT to reflect manipulations which have occurred in or across the various texts used in the treatment.

	00	Text Not Focus of Treatment
Content	01	Quantity (Length)
	02	Density (# of Concepts; # of Propositions)
	03	Repetition of Concepts
	04	Explicitness (Concreteness, Ambiguity)
	05	Discourse Type (Expository)
	06	Writer's Intent (Argumentation, Persuasion)
Structures	07	Syntactic Complexity
	08	Semantic Repetitiveness
	09	Cohesion (Syntactic Structures Semantic Structures, Referents)
	10	Organizational Structures (Story Structure, Global Structure, Story Elements)
	11	Propositional Structure (Order)
Context	12	Physical Appearance
	13	Illustrations

__ __ Reader

- Code when treatment is designed to affect reader characteristics or when READERS have been preselected, screened, or permitted to vary by treatment condition.

	00	Reader Not Focus of Treatment
Perspective	01	Reader Response
Background	02	Schema Availability (Knowledge of Content)
	03	Knowledge of Syntax
	04	Knowledge of Genre (Text Structure)
Psychological	05	Learning style
	06	Risk taking
	07	Attitude
	08	Interest
	09	Flexibility
Metalinguistic	10	Apply Old (Process, Strategy)
Metacognitive	11	Apply New (Process, Strategy)

__ __ Task

- Code when the procedures or directions used were a key manipultation.

	00	Task Not Focus of Treatment
Conditions	01	Order (Lesson Frameworks)
	02	Time
	03	Functionality (School-based vrs non-school based)
	04	Teacher expectation/behavior
Stance	05	Efferent (Expository Text)
	06	Aesthetic (Narrative/Live-Through Experience)
Nature	07	Individualized/Independent
	08	Group/Social
Contexts	09	Situational (Lg School; Program)
	10	Cultural
	11	Linguistic (Cloze/Maze)
Conditions	12	Perceptual/Motor
Nature	13	Modality (Contrast)
Conditions	14	Rate
	15	Reward

__ __ Processing Strategies

- Code to reflect the level of cognitive activity on which the researcher focused.

	00	PS Not Focus of Treatment
Transfer	01	Recall (Supporting Details and Facts, Literal Level Questioning; On-Line Meaning Maintenance Main Idea; Detail)
	02	Word Meanings
	03	Identifying text structure (Story Elements, Sequence, Referents)
Interaction	04	Inference (Drawing Conclusions, Interpretative Reading Comprehension, Making Generalizations, Cause and Effect, Author's Point of View, Deduction, Induction)
	05	Schema Construction
	06	Schema Maintenance
	07	Schema Selection (Figurative Language, Fact and Opinion, Comparing and Contrasting)
	08	Prediction (Hypothesize, Predicting Outcomes, Problem Solving)
	09	Macro-operators (Chunk, Categorize, Summarize Written Information)
Transaction	10	Transmediation
	11	Abduction (Analogy, Metaphor)

__ __ Linguistic Unit

01 Non-word Units
02 Words
03 Clause or Phrase Level
04 Sentences
05 Paragraph
06 Multiple Paragraphs
07 Text

__ __ Materials

01 Learner Made
02 Teacher Made
03 Researcher Generated
04 Commerically Available by Publisher of Reading Materials
05 Trade/Library

__ __ Instructional Focus

00 Instruction not Focus of Study
01 Immersion (Experience Real Process)
02 Direct teaching
03 Environmental Support (Leading from behind; Discovery Lng)
04 Material Governed (Programmed Learning)

__ __ __ Dominant Focus of Treatment

1 __ __ = Text + Particular Code (e.g., story structure was key aspect studied. Code 110.)
2 __ __ = Reader + Particular Code (e.g., a prereading activity was key aspect studied. Code 202.)
3 __ __ = Task + Particular Code (e.g., order of reading related concept materials was key aspect studied. Code 301.)
4 __ __ = Processing Strategies + Particular Code (e.g., readers were taught and tested on their

conscious awareness of reading strategies. Code 416.)

5 __ __ = Linguistic Unit + Particular Code (e.g., word recognition in text was key aspect studied. Code 507.)

6 __ __ = Materials + Particular Code (e.g., child-authored materials was key aspect studied. Code 601.)

7 __ __ = Instructional Focus + Particular Code (e.g., a free-choice reading program was key aspect studied. Code 701.)

PART III

Dependent Measures

- Code dependent measures which reflect major research questions asked.
- When less is better, adjust treatment and control measurements by multiplying by a constant.
- Use labels such that another coder can identify which dependent measure is being referred when he or she reads the report.
- Code MEAN and STANDARD DEVIATION OF TREATMENT GROUP, MEAN and STANDARD DEVIATION OF CONTROL GROUP, INTERNAL CONSISTENCY, KIND OF MEASURE, TYPE OF MEASURE, and UNIT for each dependent measure identified.

Measurements

__ __ __ __ __ Mean of Treatment Group

__ __ __ __ __ Standard Deviation of Treatment Group

__ __ __ __ __ Mean of Control Group

__ __ __ __ __ Standard Deviation of Control Group

__ Internal Consistency

1 = High (Match Between What Is Taught & What Is Tested, e.g., teach inferencing; test inferencing)

2 = Medium (General Test of What Was Taught, e.g., teach inferencing; test reading achievement)

3 = Low (Marginal Relationship Between What Was Taught and What Was Tested, e.g., teach inferencing; test attitude)

Charactertistics of Measures

__ __ Kind of Measure

01 = Phonic Test
02 = Vocabulary Test (Word Recognition)
03 = Other Word Analysis Test
(Includes tests of structural analysis)
04 = Rate of Reading
05 = Reading Comprehension - Questions
(Any measure that ascertains comprehension through questions - multiple choice, open-ended, true/false)
06 = Reading Comprehension - Cloze
07 = Reading Comprehension - Miscue
08 = Reading Comprehension - Retelling
09 = Composite Reading Score - Achievement Test
10 = Oral Reading Grade Level
11 = Attitude
12 = Self Concept
13 = Readiness Test
14 = Spelling
15 = Other Writing
(A test of any other aspect of writing skill other than spelling)
16 = Other
(Any other measure of post treatment performance.)

__ Type of Measure

1 = Standardized
2 = Not Standardized or Unspecified

__ Unit

1 = Non-word Units
2 = Words
3 = Phrases
4 = Sentences
5 = Paragraph
6 = Multiple Paragraphs (Standardized Tests of Reading Comprehension)
7 = Text

Appendix B

HYPOTHESES RESEARCHERS TEST IN THE NAME OF READING COMPREHENSION

REFERENCE: Research to Improve Reading Comprehension of Handicapped Students, USDE Funded Research, Indiana University, 1983-85. Co-Principal Investigators: Jerome C. Harste, Pamela R. Terry. Project Director: Philip Harris. This form developed by Jerome Harste, Deborah Rowe, Diane Stephens, Sharon Snyder, Karin Dahl, Katherine Short, Barbara Roberts, Mark Gabehart, Jean Anne Clyde.

KEY

* = Studies included in meta-analysis
> = Dominant
# = NonDominant, Currently Evolving
+ = NonDominant, Future Directions
$ = Bridging

TEXT

$+101. Having children from the start encounter whole, meaningful texts would do much to improve reading comprehension.

(Usually tested when not the dominant focus of the study; Laufer & Dvorkin 81; Kleiman 79)

102. Controlled vocabulary materials, based either on frequency of word use or letter-sound patterns introduced, would do much to improve the teaching of reading comprehension.

(Armstrong 83; Britton, Westbrook & Holdridge 78; Freebody & Anderson 81; Freebody & Anderson 83; *Kameenui, Carnine & Freschi 82; Kibby 79; Marks, Doctorow & Wittrock 74; Mason, Kniseley & Kendall 79; Pearson & Studt 75; *Phifer, McNickle, Rouning & Glover 83; Schwantes 82; Shaffer 77; Tamor 81)

>103. Instructional materials in which important concepts are repeated and highlighted through the use of questions, structured overviews, etc., would do much to imporve the teaching of reading comprehension.

(Bates n.d.; Britton, Westbrook & Holdredge 78; Cachman n. d.; Cole 77; Dooling & Lachman 71; *Duchastel 79; *Ellis, Konoske, Wulfeck & Montague 82; Ellis, Wulfeck & Montague 80; Fowler & Lamberg 79; Frase, Patrick & Schumer 70; Frase & Schwartz 75; *Hayes & Readence 82; *Hiller 74; *Kameenui, Carnine & Freschi 82; *Karahalios, Tonjes & Towner 79; Kosoff 81; Kuhara & Hatano 80; Lackman 76; *LaPorte & Voss 75; *Luiten et al. 80; Mayer 83; Manelis & Yekovich 76; Morse 76; Meek 79; Noakes n.d.; *Peleg & Moore 82; Peterson, Glover & Ronning 80; Reynolds & Anderson 82; Reynolds, Standiford & Anderson

79; Richmond 76; *Rickards & Denner 79; Rickards & Hatcher 78; Rickards & McCormick 77; Rickards, Anderson & McCormick 76; Rickards, 76a; Rickards 76b; Rothkoph 72; Royer & Cable 75; Sagaria & DiVesta 78; Schumacher, Moser & Young 83; Sefkow & Meyers 80; Shavelson, Berliner, Ravitch & Loeding 74; Sjogren & Timpson 79; Vacca 78; Vacca 80; Wiesendanger & Wollenberg 78; *Wilhite 84; Wixson 81; Wixson 84)

>104. Instructional materials in which new concepts are explained concretely would do much to improve the teaching of reading comprehension.

(Alvoid 83; *Baumann, Walker & Johnson 81; Carter 77; Cunningham 76; *Dufflemeyer 79; Goetz 79; Johnson 74; Levinson & Carpenter 74; Marshall & Glock 78-79; Mayer 83; *Negin & Rios 80; Nicholson 79; Nicholson & Imlach 81; Olshavsky & Kletzing 79; Pezdek & Royer 74; Raphael, Myers, Tirre, Fritz & Peadbody 81; Schallert 76; Stupay 77; Winklejohan 79; *Wittrock, Marks & Doctorow 75)

>$105. Having children from the start encounter content area materials, in addition to narrative, would do much to improve reading comprehension.

(Usually tested when it is not the dominant focus of the study; Alvermann & Boothby n.d.)

+106. Instructional materials which teach children how the author's purpose affects the organization of the text would do much to improve reading comprehension.

(Bisanz 82; *Cohen & Staver 81)

107. Instructional materials which are controlled for syntactic complexity would do much to improve reading comprehension.

(Anderson 74; Baldwin 77; Gowie n.d.; Larsen, Parker & Trenholme 78; Pearson 74-75; Rips, Smith & Shoben 78; Schmidt 78)

108. Instructional materials which insure semantic redundancy on important concepts would do much to improve the teaching of reading comprehension.

(Cole, 77; *Rickards 75-76; *Robbins 83)

>109. Instructional materials which teach children how to cohesively follow a chain of ideas through a text would do much to improve reading comprehension.

(Barnitz 80; Beck, McKeown, Omanson & Pope 84; Chapman 82; *Cohen & Stover 81; Coggiola n.d.; DeVilliers 74; Fishman n.d.; Freebody & Anderson n.d.; Garrod & Sanford 77; Garvey, Caramazza & Yates n.d.; Gottsdanker-Willekens 81; Gourley 84; *Haberlandt & Bingham 76; Halff et al. 76; *Irwin 82; Juel 80; *Kameenui, Carnine & Freschi

82; Kemper & Catlin n.d.; King & Greeno 74; Lesgold 74; Lindsey 83; McGee 81; *McGill-Franzen & Gormley n.d.; Marshall & Glock 78-79; *Meyer & Freedle 84; O'Shea & Sindelar 83; Peltz 73-74; Peters 75-76; Richek 76-77; *Phifer, McNickle, Rouning & Glover 83; *Roen 84; *Soltis & Pflaum 79; Todd-Mancillas 82; *West, Stanovich, Feeman & Cunningham 83)

>110. Instructional materials which highlight the organizational structure of the text would do much to improve reading comprehension.

(Alvermann 81; *Arnold & Brooks 76; Aulls 75; Cirilo & Foss 80; Danner 76; Elliott 80; Johnson 70; Kintsch & Yarbrough 82; Kulhavy, Schmid & Walker 77; Marshall & Glock 78-79; *Meyer, Brandt & Bluth 80; Nezworski, Stein & Trabasso 79; *Raphael, Myers, Tirre, Fritz & Peabody 81; *Rickards 75-76; Thorndyke 77; Williams et al. 81)

111. Instructional materials in which ideas were presented in a logical order would do much to improve reading comprehension.

(*Cohen & Stover 81; *Irwin 80)

+112. Instructional materials which represent the varieties of print and which are packaged more realistically -- so that stories look like trade books as opposed to basal readers and content area selections look like they come from content area books — would do much to improve reading comprehension.

(*Bialeck, Bialeck & Wark 77; Brozo et al. 83; *Carver 75; Coots & Snow 82; Evans, Taylor & Blum 77; Fray & Wozniak 83; Kintsch & Kozminsky 77; Lazerson 74-75; Mitchell, Bradley & Ames 82; Pratt, Krane & Kendall 81; Pyrczak 80; Stansell, Harste & DeSanti 78; *Willows 74)

>113. Instructional materials which use illustrations more effectively to support print would do much to improve reading comprehension.

(Arlin, Scott & Webster 78-79; *Arnold & Brooks 76; *Cohen & Stover 81; Cole 77; Denburg 76-77; Donald 79; Donald 83; Dwyer 71; *Harzem, Lee & Miles 76; *Hayes 83; *Hayes & Henk 84; Hayes & Readence 82; Harber 83; *Peeck 74; Ruch & Levin 77; *Snowman 76; Thomas 78; Grinnell 82)

READER

+201. Instructional guidelines for how teachers might help students assume or take a perspective for purposes of interpretation of text would do much to improve reading comprehension.

(Anderson & Pichert 78; Anderson, Reynolds, Schallert 77; Anderson, Pichert & Shirey 83; Black, Turner & Bower 79; Borko & Eisenhart 84;

Cambell 81; Cullinan, Harwood & Galda 83; Ehrenreich & Knafle 82a; Ehrenreich & Knafle 82b; Eisenhart & Borko 84; Fass & Schuymacker 81; Galda 82; Goetz, Reynolds, Schallert & Radin 83; Grabe 79; Grabe & Prentice 79; *Henderson & Shanker 78; Ido-Maestas 80; Kintsch & Greene n.d.; *Lipson 83; Michaels & Cazden 84; Pichert 77; Pcihert 79; Pichert & Anderson 82; Reynolds, Taylor, Steffensen, Shirley & Anderson 82; Steffensen, Joag-Dev & Anderson 79)

>202. Instructional guidelines for how teachers might go about identifying and building background knowledge for reading a text would do much to improve the teaching of reading comprehension.

(Anderson, Spiro, Anderson 78; Brown, Smiley, Day, Townsend & Lawton 77; Crafton 83; Clifton 81; Christopherson, Schultz & Waern 81; Graves, Brunetti & Slater 82; Hare 82; *Holmes n.d.; Holmes 83; Johnston 84; *Kinzer 83; Langer & Nicolich 81; *Lipson 82; *Marr & Gormley 82; *Pearson, Hansen & Gordon 79; Reder & Anderson 80; Ribovich 79; *Smith, Readence & Alverman 84; Spiro 80; Stevens 82; Sulin & Dooling 74)

203. Instructional guidelines for helping students use and expand their knowledge of syntax, or the flow of language in various print settings, would do much to improve reading comprehension.

(Beebe 80; *Carr 83; Cioffi 82; Day et al. 81; Isakson & Miller 76; Kaminsky, Harrison & Bell 77; Miller-Jones 84; Miller & Hosticka 78; Nilagupta 77; Stephensen, Reynolds, McClure & Guthrie 82)

>204. Instructional guidelines for helping students develop mental expectations for genre — that stories are formatted and organized differently from content area materials, for example — can do much to improve reading comprehension.

(Brown 77; Duffelmeyer 81; Fagan 84; Grinnell n.d.; Hayes et al. 77; Ianner, Hiebert & Winograd 84; Kintsch 78; McGee 82a; McGee 82b; Meyer, Brandt & Bluth 80; Mosenthal 79; Taylor 82; Tierney, Bridge & Cera 79; Whaley 81; Winograd 83)

205. Instructional guidelines for helping teachers match activities to students' learning styles would do much to improve the teaching of reading comprehension.

(Dorsel 75; Hansen 77; Hiebert, Winograd & Danner 84; Kersner 75; *Kimmel & MacGinitie 84; Lesiak 78; Levin, Divine-Hawkins, Kerst & Guttmann 74; Parcarella & Pflaum 81; Pitts & Thompson 82; *Pitts & Thompson 84; Readence & Balwin 78; Rich & Bush 78; Robeck 82; Roberge & Flexer 84; Taylor et al. 79)

+206. Instructional guidelines for helping teachers and students understand the centrality of risk-taking in reading, as well as the value of a low-risk environment when one is learning to read, would do much to improve the teaching of reading comprehension.

(*Mosenthal & Na 80)

S207. Instructional guidelines for helping students develop positive attitudes toward reading would do much to improve reading comprehension.

(Usually tested when not the dominant focus of the study; Peter 78)

208. Instructional guidelines for helping teachers build an individualized reading program based on student interest would do much to improve reading comprehension.

(Asher, Hymel & Wigfield 78; Asher 79; Newman 77; Stevens 80; Summers & Lakasevich 83; *Szaba & Lameill-Landy 81; Walker, Noland & Greenshields 79)

#209. Instructional guidelines for helping students understand and flexibly apply a variety of reading strategies when they encounter something unknown in print would do much to improve reading comprehension.

(Dowdy et al. 82; *Finch 82; Meyer & Rice 83; Nevell & Hoffman 81; Olshavsky 78; Spiro & Tirre 80)

>210. Instructional guidelines for helping students apply the strategies they already have to new settings would do much to improve a child's reading comprehension.

(Anderson 76; Atwell 82; Baker & Anderson 82; Bos & Filip 84; Brooks et al. 77; Brown & Day 83; Brown, Day & Jones 83; Brown & Smiley 78; Brown et al. 83; Cauley & Murray 82; Clark 82; D'Angelo 81; Ewoldt 81; Fitzgerald 82; *Garner 81; Garner 82; Garner & Alexander 82; Garner & Reis 81; Garner & Tyalor 82; Garner, Wagoner & Smith 83; Grinnell 82; Hare 81; Hiebert 81; Kavale 80; Kavale & Schreiner 79; Kendall & Hood 79; *Kimmel & MacGinitie 84; Laffey & Muia n.d.; MacGinitie & MacGinitie 84; Masonheimer et al. 84; McGee 82; Meyer et al. 80; Meyer & Rice 83; Meyers & Paris 78; Mosenthal 79; Mosenthal & Davidson-Mosenthal 82; Nilagupta 77; Olshavsky 76; *Piromruen & Boonprasert 83; Pitts et al. 83; Sulzby 78; Taylor & Williams 83; Tenny 75; Winograd 83a; *Winograd 83b; Winograd & Johnston 82; Wong & Jones 82)

>211. Instructional guidelines for helping students develop new reading strategies (strategies which they do not already possess such as self-correcting and self-monitoring) would do much to improve reading comprehension.

(*Adams, Carnine & Gersten 82; *Barnett 84; Bates 83; *Carr 83; Calfee & Piontowski 81; Carnine 77; Clark, Deshler, Schumaker, Alley & Warner 84; Cohen 83; *Ellis, Knoske & Wulfeck 82; *Finch 82; Frase & Schwartz 75; *Geva 83; Grabe & Mann 84; Garner 82; Garner & Hare 84; *Graver, Cooke & Laberge 83; Hayward, Orlando & Bliesmer 77; Jongsma, Pound & Tips 78; *King et al. 84; Klein & Schwartz 79;

Lovelace & McKnight 80; Morse 76; Nicholson 84; Smith & Standal 81; *Taylor & Beach 84; Winograd et al. 84; Wong & Jones 82)

TASK

>301. Developing structured lesson frames which teachers might use to guide their interactions with students before, during, and after reading, would do much to improve the teaching of reading comprehension.

(*Adams, Carnine & Gerstein 82; *Alexander et al. 84; Anderson 76; Aulls & Gelbart 80; Bean & Pardi 79; Biskin, Hoskisson & Modlin 76; Blanchard 81; Colwell 82; Carver & Hoffman 81; *Cunningham 83; Hansen, Schreiner & Hummel 77; Laffey & Kelly n.d.; *Langer 84; Lindsey 80; *Malcolm, Albertini, Burke & Humphrey 80; Miller, McKenna & Kear 82; O'Shea & Sinelar n.d.; Pauls & Garrett 84; Petre 76; Pflaum & Bryan n.d.; Sachs 83; Salomon & Achenbach 74; Schumaker & Deshler 82; Stetson 81; *White, Pascarella & Pflaum 81; Wolf 78; Wixson 84; *Wixson, Yochum & Bosky 84; Yesseldyke et al. 84)

302. Procedures which help teachers understand time on task and its relationship to student learning would do much to improve the teaching of reading comprehension.

(Allington, 80; *Becker 77; *Fleischer & Jenkins 83; Gambrell, Wilson & Gantt 81;*Kulhavy & Swenson 75; *Hayes & Tierney 82; *Tuinmann & Brady 74; Yasseldyke & Alghozzine 83)

S+303. Understanding how the rules of language use change across reading contexts so that the various uses of reading in classrooms relate more realistically and functionally to reading outside the classroom would improve the teaching of reading comprehension.

(Usually tested when not dominant focus of the study; *Elley & Mangubhai 83)

>304. Procedures which help teachers understand how their expectations, beliefs, and instructional strategies affect student expectations, beliefs, and reading behaviors would do much to improve reading comprehension.

(Allington 80; Allington 84; Bloome & Argumedo 84; Borko 82; *Duell 74; Furniss & Graves 80; Gall, Ward, Berliner, Cahen, Winne, Elashott & Stanton 78; Kibby 79; *Luftig 83; *Mohr et al. 84; Moore & Cunningham 83; Pehrsson 74)

>$305. Procedures which help teachers more effectively use texts in content area teaching would do much to improve reading comprehension.

(Usually tested when it is not the dominant focus of the study)

S#306. Procedures which help teachers facilitate the reader's aesthetic response to text — that is, have children experience and value reading as a lived-through experience — would do much to improve reading comprehension.

(Usually tested when it is not the dominant focus of the study; Dixon & von Eye 84)

307. Procedures which help teachers individualize instruction, thus permitting children to work more independently in reading, would do much to improve reading comprehension.

(*Aaron & Muench 74; Cox & Wilson 81; Reinking & Schreiner 84; Sindelar 82a; *Sindelar 82b; Patching, Kameenui, Carnine, Gersten & Colvin 83)

S+308. Procedures which help teachers capitalize on the social nature of classrooms and language, and which promote collaboration and peer support for reading, would do much to improve reading comprehension.

(Usually tested when not dominant focus of the study; Mosenthal 83)

>309. Procedures for helping teachers orchestrate and understand how situtational factors, including those above and beyond the classroom level, impact on teaching and learning would do much to improve reading comprehension.

(Allington 80; Au & Mason 81; Au 80; Bloome & Argumendo n.d.; Calfee & Piontkowski 81; *Cornelius & Semmel 82; Durkin 79; Durkin 83; Kurth & Greenlaw 84; Leinhardt, Zignomd & Cooley 81; Lovitt & DeMier 84; Mason 83; Mosenthal 83; Neilsen, Rennie & Connell n.d.; Pierce 84; Singer et al. 84; Smith 83; Smith & Feathrs 82; Stauffer & Hammond 76; Stauffer n.d.; Stauffer n.d.; Stockdale & Crump 81; *Taylor 84; Tharp 82; Vacca 80)

S+310. Procedures which help teachers build a reading program which respects and makes connection with the cultural strengths and backgrounds of students would do much to improve reading comprehension.

(Usually tested when it is not the dominant focus of the study; *Cohen & Rodriquez 80; *Lipson 83; *White 79)

311. Procedures which help teachers design cloze and maze activities for the instructional purposes of highlighting and facilitating reader's attention to particular linguistic features in text would do much to improve reading comprehension.

(Dixon & von Eye 84; *Ehri & Wilce 80; *Irwin 80; *Schwartz 80; Smith-Burke et al. 78; *Straw & Schreiner 82; Zinck 78)

312. Procedures for helping teachers understand and exploit the

relationship between reading comprehension activities and perceptual/motor training exercises would do much to improve reading comprehension.

(Griffin, Walton & Ives 74; Lindsey 83; Punnett & Steinhauer 84; Riley & Lowe n.d.; Sailor & Ball 75; Swanson 83; Swanson 84)

>313. Knowing how modality -- oral, visual, kinesthetic -- might be more effectively used to facilitate learning would do much to improve the teaching of reading comprehension.

(Berger 78; Burge 83; Cook & Welch 80; Drader 75; Dubey & O'leary 75; Eagan 75; Juel & Holmes n.d.; Marlowe, Egner & Foreman 79; McConaughy 82; Miller & Smith 84; Rowell 75; Smiley, Oakey Worthen, Chapione & Brown 79; Snow, Coots & Smith 82; Walker 75-76; Weisberg 79; Wiesendanger & Birlem 81; Wiseman, Hartwell & Hannifin 80)

314. Procedures which help students understand that reading rate should vary with the purpose for reading would improve reading comprehension.

(Coclin et al. 84; Collins 79; Perfetti & Goldman 76; Samuels, Begy & Chen n.d.)

315. Procedures for helping teachers understand and exploit the relationship between intrinsic and extrinsic rewards and student reading behavior would do much to improve reading comprehension.

(Jenkins, Barksdale & Clinton 78; Lovitt & Hansen 76; Roberts & Smith 80; Swanson 81)

PROCESSING STRATEGIES

>$401. Strategies which help students recall facts, monitor on-line meaning, and identify main ideas, would do much to improve reading comprehension.

(Beebe n.d.; Blachowicz 78; Britton n.d.; Bridge, Belmore, Moskow, Britton, Meyer, Simpson, Cohen & Matthews 84; Dixon & von Eye 84; Dubbs 79; Gagne & Memory 78; Golinkoff & Rosinki 78; Gottesman et al. 82; Hansen 78; Isakson 79; Kagan 83; Levy 77; Marzano et al. 76; Omanson, Beck, Voss & McKeown 84; Perfetti & Hogaboam 75; Nelson & Geyer n.d.; *Pearson, Hansen & Gordon 79; Perfetti & Goldman 76; Pflaum & Bryan n.d.; Reid & Hresko 80; *Rickards 78; *Wixon, Yochum & Bosky 84)

>402. Strategies which help students learn new vocabulary words and improve word identification would do much to improve reading comprehension.

(*Abramovici 84; Anderson, Pichert, Goetz, Schallert, Stevens & Trollip n.d.; Anderson, Stevens, Shrifrin & Osborn 78; *Arnold, McNinch & Miller 78; Balasa 74; *Beck, Perfetti & McKeown 82; *Canney & Schreiner 76-77; *Carnine, Kameenui & Coyle 84; *Cartelli 77; *Chabot, Zehr, Prinzo & Petrosky 84; Cleary n.d.; *Cunningham & Cunningham 78; Gipe 78-79; Hatch et al. 74; Jackson 79; Jacoby, Craik & Begg 79; Jenkins, Larson & Fleisher 83; *Kameenui, Carnine & Freschi 82; *Katz & Singer 82; Kamil & Hanson 78; McKeown, Beck, Omanson & Perfetti 83; *Nemko 84; *Panny & Jenkins 78; *Pany, Jenkins & Schreck 82; *Rash, Johnson & Gleadow 84; Roser & Juel 82; *Samuels, Dahl & Archwamety 74; *Stahl 83; Stanovich, Cunningham & Feeman (in press); *Till, Cormak & Prince 77; Vaughn, Castle, Gilbert & Love 82)

>$403. Strategies which help students identify important elements in texts such as plot, sequence, and story line would do much to improve reading comprehension.

(Related to 204; Bauman 83; Coggiola n.d.; Eamon 79; *Geva 83; *Katz & Singer 82; *Sampson, Valmont & Van Allen 82; Sebasta, Calder & Cleland 82; Staadt & Balbo 79; *Weaver 79; Weaver & Dickinson 82)

>404. Strategies which help students draw conclusions, make generalizations, and in general improve their inferencing abilities, would do much to improve reading comprehension.

(*Baumann 84; *Beebe & Malicky 82; Bos & Tierney 84; Brockway, Chmielewski & Cofer 74; Burton, Niles & Wildman 81; Carpenter & Jones 75; *Carr, Dewitz & Patberg 83; *Chodos, Gould & Rusch 77; Corbett & Dosher 78; *Cunningham 83; Dixon & von Eye 84; Frederiksen 75; *Garner & Alexander 81; Galda 82; Garner 81; Garrod & Sanford 77; Goetz 79; *Gordon 80; *Gordon & Braun 82; Greenlaw & McIntosh 84; Haggard 78; Hansen 81; Lipson 82; *Patching, Kameenui, Carnine, Gersten & Colvin 83; Raphael & McKinney 83; Singer 79; Singer 80; Stahl 83; *Till, Cormak & Prince 77; Wilson & Hammill 82; *Winograd & Johnston 82; *Wixon, Yochum & Bosky 84)

>$405. Strategies which help students mentally construct schema or maps of how new concepts and ideas interrelate in the text they are reading would do much to improve reading comprehension.

(Usually tested when it is not the dominant focus of the study; *Carr, Dewitz & Patberg 83; Healey 82; Spiro n.d.; *Singer & Donlan 82)

406. Strategies which help students maintain reading skills through application to new selections would do much to improve reading comprehension.

(Gagne & Memory 78; Marr 79; Shoben, Wescourt & Smith 78; Smith, Adams & Schorr 78)

+407. Strategies which help students read critically for purposes of distinguishing fact from opinion, comparing and contrasting, and interpreting figurative language, would do much to improve the teaching of reading comprehension.

(*Alvermann 83; *Winograd & Johnston 82)

>$408. Strategies which help students more actively engage in text prediction and hypothesis testing would do much to improve reading comprehension.

(Usually tested when it is not the dominant focus of the study; Related to 406; Gagne & Memory 78; Kavale & Schreiner 79; Parker & Putnam 84)

>409. Strategies which help students summarize by coherently reducing and organizing what they have read would do much to improve reading comprehension.

(Bates 83; *Bean, Singer, Sorter & Frazee 83; *Chodos, Gould & Rusch 77; Cunningham 82; Eanet 78; *Gordon & Braun 82; *Hare & Smith 82; *Meyer, Brandt & Bluth 80; Stein & Glenn 78; *Taylor 82; Williams & Taylor 83; Williams 84; *Winograd 84)

>410. Strategies which encourage students to recast meanings gained through reading in alternate communication systems such as writing, art, mathematics, music, etc., would do much to improve the teaching of reading comprehension.

(Cramer 80; *Finch 82; Gagne & Memory 78; Galda 82; *Gambrell 82; Hayes & Readence 82; Koskinen & Cole 81; *Lesgold, McCormick & Golinkoff 75; *Linden & Wittrock 81; *Pressley 76; Sheldon 84; Siegel 84; Steingart & Glock 79; *Sadoski 83; *Sadoski 84)

>411. Methods and materials which encourage students to make connections, via metaphor and analogy, between their past experiences and what they already know, would do much to further their independent construction of new knowledge and to improve reading comprehension.

(Billow 75; Douglas & Peel 79; Gagne & Memory 78; Galda 82; Gick & Holyoak 80; Haggard 76; Hayes & Henk 84; Hayes & Tierney 82; *Kulhavy & Swenson 75; Levinson & Carpenter 74; *Linden & Wittrock 81; *Till, Cormak & Prince 77; Wosniadou & Ortony 84; Winner, Rosenstiel & Gardner 76; *Yeazell 82)

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Appendix D

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Jerome Harste's writings range widely. Recently Professor Harste has completed with Drs. Carolyn Burke and Virginia Woodward, a seven year study of what preschool children ages 3, 4, 5, and 6 know about reading and writing. Their book, Language Stories & Literacy Lessons, is recommended reading for teachers and teacher educators. Together with Dr. Pamela Terry, Jerry has been co-principal investigator on this grant. An author of children's books and a host developer of a professional videotape series (The Authoring Cycle: Read Better, Write Better, Reason Better), this project marks a return for Dr. Harste to his interest in reading comprehension and the special child.

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